September, 1947

THE FOUNDRY

wherever metals are cast...

FOUNDRY LIBRARY
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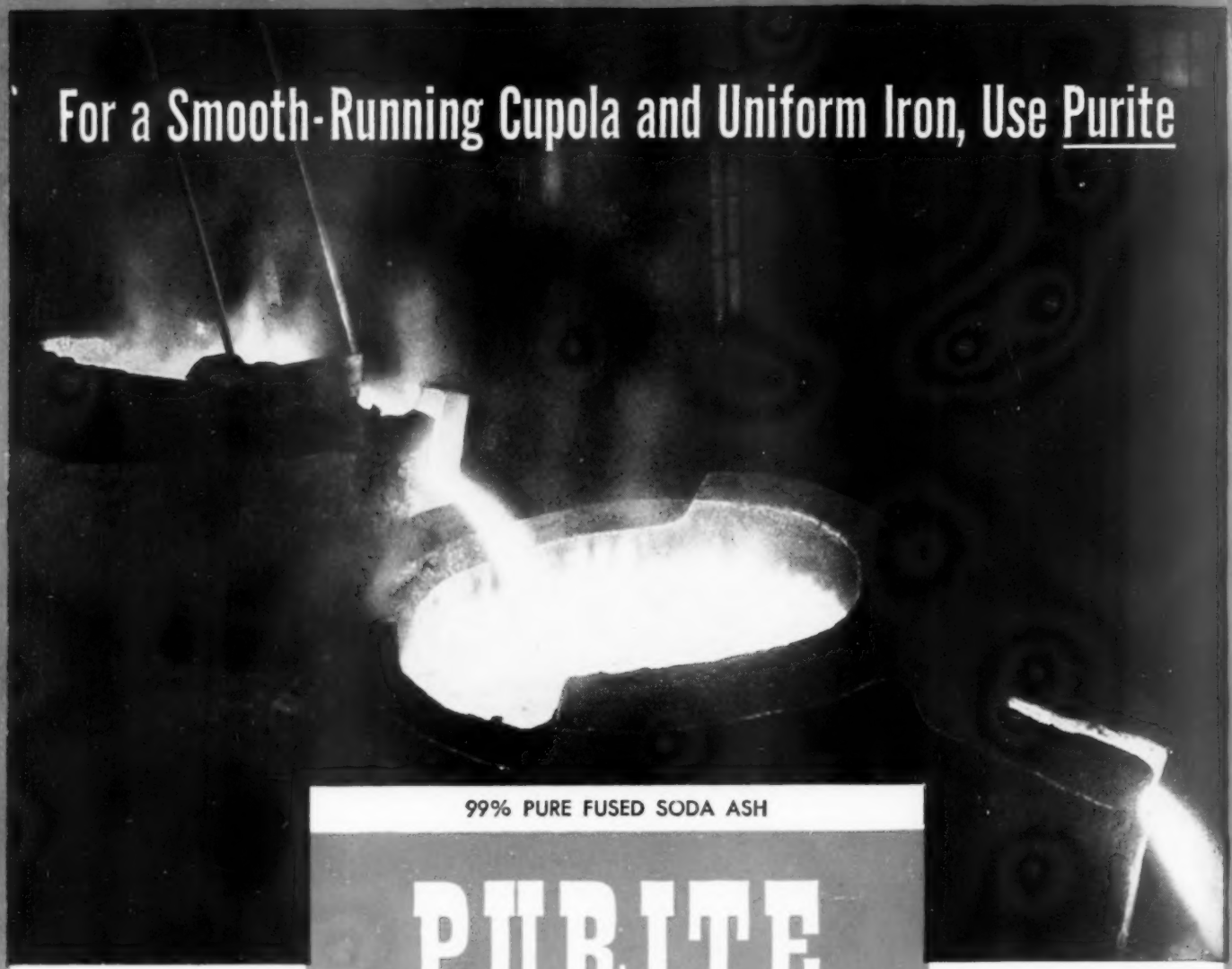
STILL THE BEST OF THE BENTONITES

For a Smooth-Running Cupola and Uniform Iron, Use Purite



99% PURE FUSED SODA ASH

PURITE

The Scientific Flux for Better Melting and Cleaner Iron

A smooth-operating cupola, from the start to the finish of the heat, is the first essential in maintaining uniform iron in the mass production of specification castings.

Purite—in the cupola hearth or in the ladle—helps smooth out variations in the molten metal. By accelerating combustion reactions, Purite restricts the combustion zone to a smaller, hotter area over the tuyeres; it prevents bridging and reduces oxidation of the metal charge. Purite makes a refining slag which purges the molten iron of sulfur, oxides and silicates and thus helps to improve machinability and to reduce shrinkage and segregation defects.

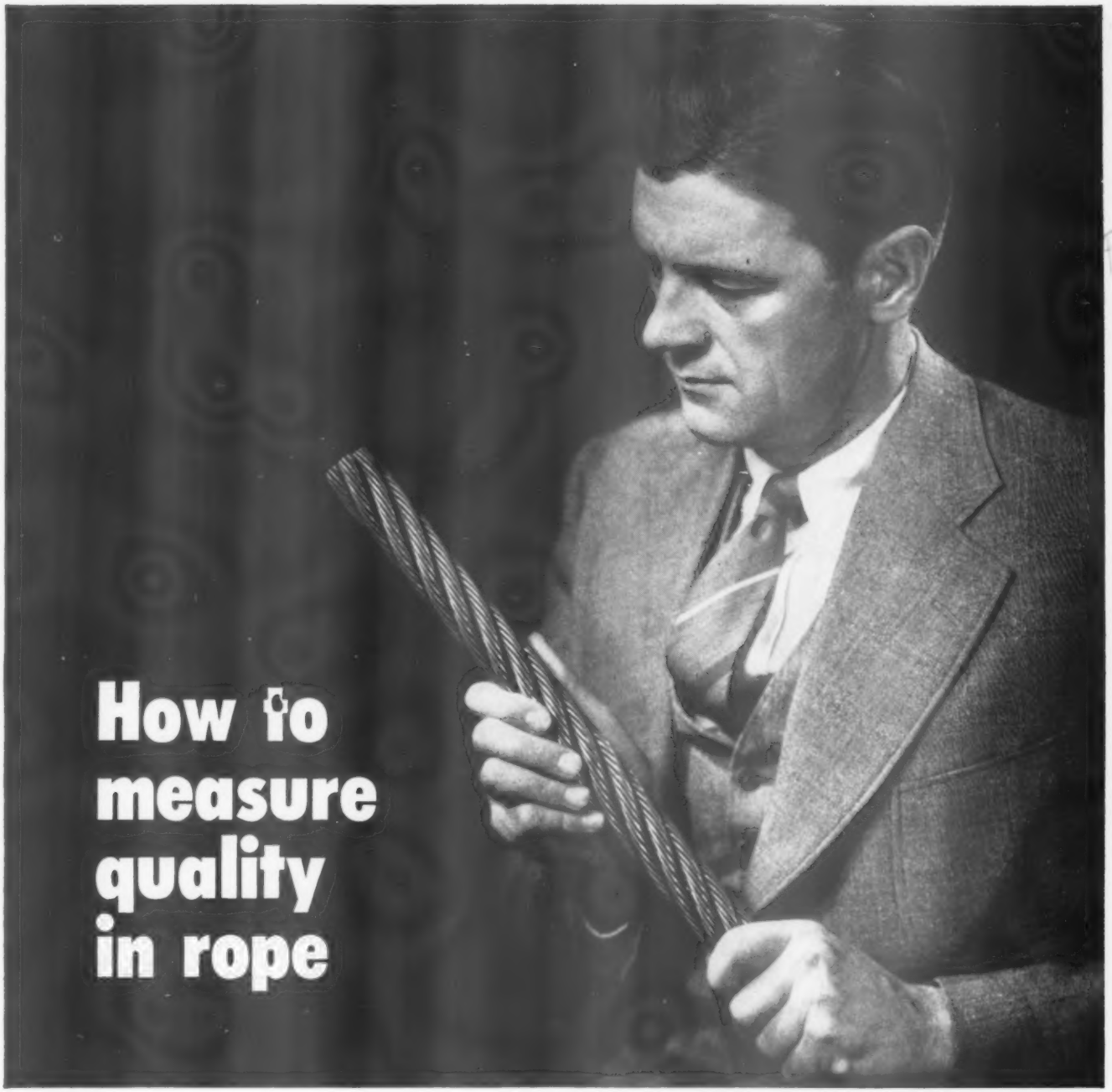
Purite has been used for over 20 years in helping to make sounder and better castings. Can you afford to overlook this inexpensive means of improving your castings?

Our advice is always available—to help you improve your cupola practice and make better castings with Purite.

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
In Canada: Railway & Power Engineering Corporation, Limited

Mathieson
CHEMICALS

Purite (Fused Soda Ash) . . . Chlorine Dioxide . . . Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua . . . Sodium Chlorite Products . . . Liquid Chlorine . . . HTH Products . . . Synthetic Salt Cake . . . Dry Ice . . . Carbonic Gas . . . Sodium Methylate



A *good* wire rope has the reserve strength to handle your heaviest foundry loads with safety.

A *good* wire rope has the guts and endurance that mean long life—hence fewer replacements.

A *good* wire rope has the proper flexibility for use on your ladle cranes and other hoisting machines.

A *good* wire rope is a source of satisfaction . . . because it performs as you want it to perform.

Bethlehem's Purple Strand meets all these requirements. It is a *good* wire rope by every measure of quality.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

When you think WIRE ROPE . . . think BETHLEHEM

CROWN HILL
SEACOAL FACING
does a better job, because...

when molten metal comes in contact with any seacoal facing the seacoal volatilizes and spreads a cushion of smoky gas between the metal and the sand, thus preventing the metal from burning onto the sand, facilitating cleaning of the casting. The thickness of the smoky gas varies with the amount of seacoal in the sand and the volatile content of the coal. CROWN HILL consistently runs high in volatile matter . . . therefore its performance of duty is always above par. That's why CROWN HILL means cleaner castings, lower costs, higher quality and fewer rejects.

FIGURES FROM BUREAU OF MINES DEPT. OF INTERIOR OF THE U. S.

(Moisture Free)

PROXIMATE ANALYSIS

Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS

Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
	100.0%

Fusion Point of Ash....2,780°F.

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant — Mines

CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • NEW YORK • ST. LOUIS • RICHMOND, VA. • UPTON, WYO.

IN TWIN CITIES: The Foundry Supply Co., Inc., 2295 University Ave., St. Paul 4, Minn. IN SOUTHWEST: Beaumont Cement Sales Co., Houston & Beaumont, Texas, and Harvey, La.

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THE FOUNDRY

for SEPTEMBER 1947

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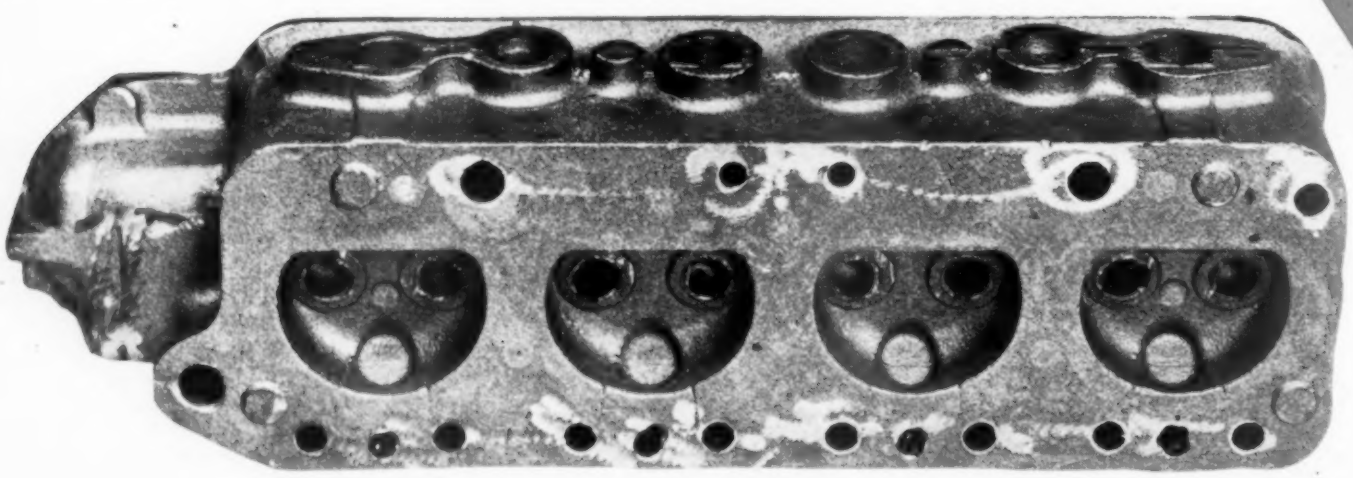
DELICATE CORES...ON

Cylinder head and jacket cores have always required extra skill to mass produce. These thin, delicate core sections, entirely surrounded by hot metal, require specialized care. But experience and better materials have put jacket cores on a production basis – with scrap so low as to be negligible.

It takes a lot of foundry "know how" to plan this job successfully. And that same "know how" demands only those materials that can always be counted on to do top notch work. It takes a core oil of good workability, clean draws, and no stickiness. Very little core oil can be used – yet these ¼ inch core sections must be strong and tough to withstand necessary handling. Metal must lay smoothly and quietly to the cores – no blows allowed. Shake out must be easy and clean so that no sand grains remain to foul the motor. This job requires a top quality core oil!

Mid City found they got best results with LINOIL. They depend upon LINOIL'S uniformity to keep production running smoothly. And – with LINOIL on this complicated job – they get less than 1% scrap.

More and more foundries – all sizes, in all types of work – are depending upon LINOIL for better cores at lowest cost. The number and prominence of these LINOIL users indicates that LINOIL has something special to offer that is unmatched!

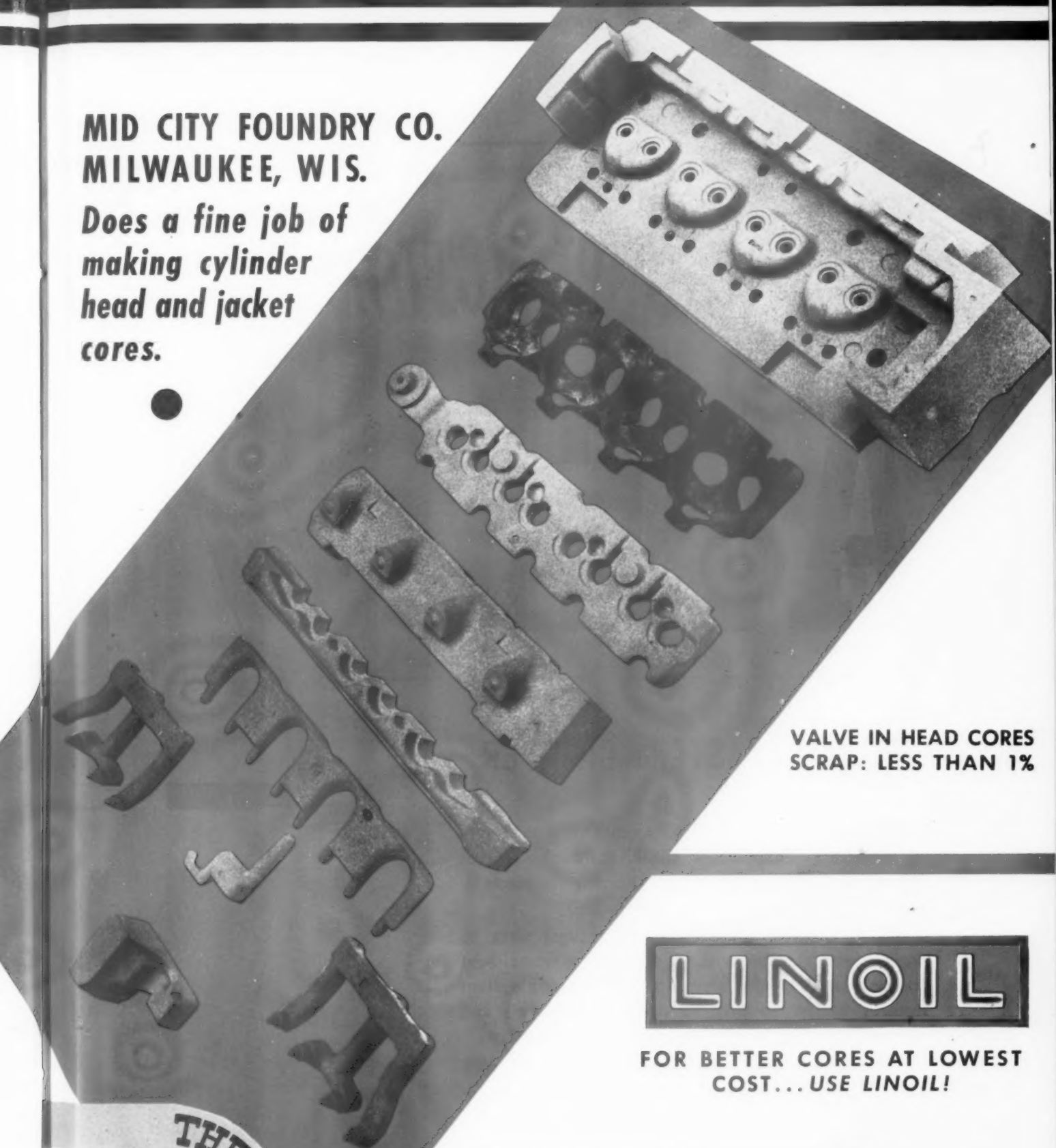


CYLINDER HEAD FOR 4 CYLINDER MOTOR

A PRODUCTION BASIS

MID CITY FOUNDRY CO.
MILWAUKEE, WIS.

Does a fine job of making cylinder head and jacket cores.



VALVE IN HEAD CORES
SCRAP: LESS THAN 1%

LINOIL

FOR BETTER CORES AT LOWEST COST... *USE LINOIL!*

THE LINOIL — THE LOGICAL OIL

WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

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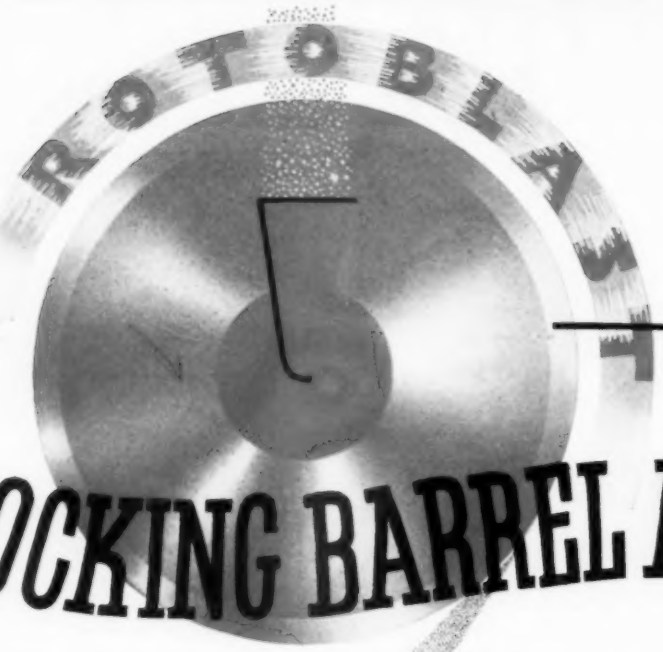


ROCKING BARREL ACTION SAVES 4

BETTER, FASTER, CHEAPER

Rocking the barrel eliminates tangling, makes sure all surfaces get exposed to the blast. *Exclusive* deflector cleats speed up cleaning by keeping the pieces in the intensive blast area.

The ROTOBLAST unit uses centrifugal force to propel metal abrasive without crushing or waste. And an *exclusive* abrasive separator and cleaning system restores usable abrasive to original cleanliness and efficiency by stratification and pneumatic treatment.

For further information on Pangborn ROTOBLAST Barrels, Tables, Special Machines, come to Pangborn.

Pangborn Corporation, 1300 Pangborn Boulevard, Hagerstown, Maryland.

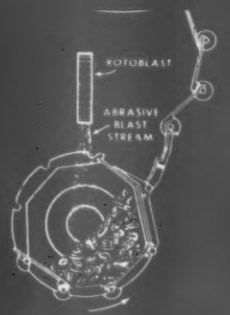
More than 24,900 Pangborn Machines Serving Industry . . .
Symbol of Quality Since 1904

BLAST CLEANS CHEAPER WITH THE RIGHT EQUIPMENT FOR EVERY JOB

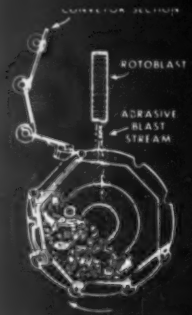
40% saving in cost of blast cleaning castings, forgings, and heat-treated parts is a typical return on an investment in Pangborn ROTOBLAST* Rocker Barrels.

An *exclusive* rocking action that turns the work and Pangborn's famous ROTOBLAST unit combine to increase cleaning output 50% in Pacific Car and Foundry's Renton, Washington plant.

*Trademark of the Pangborn Corporation



Barrel in operation — reaches extreme rear rocking position — turning work under blast stream.



Barrel reverses to extreme front rocking position — again turning work under blast stream.

21-cu-ft capacity ROTOBLAST Barrel at Renton, Wash. plant. Also in this plant are a 14-cu-ft ROTOBLAST Barrel for smaller work, a single-spindle ROTOBLAST Table for flat and fragile pieces, and a Pangborn airblast room.

for Pacific Car and Foundry Company

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

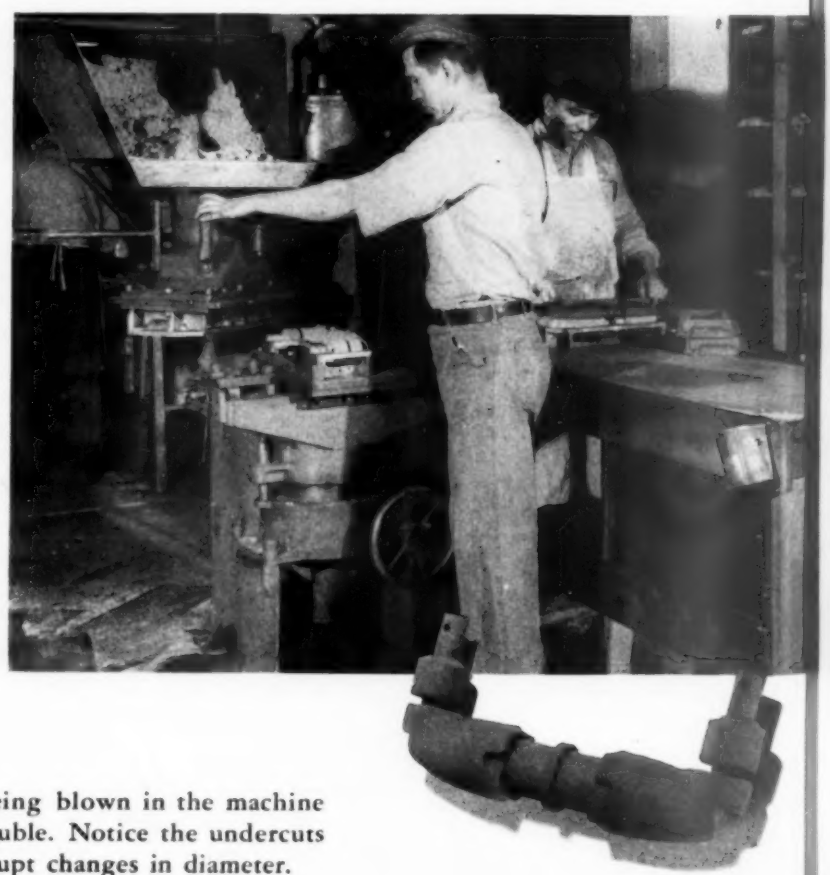
What Happens When You "Champion-ize" Your Foundry....

CHAMPION MACHINES PLUS CHAMPION METHODS BOOST PRODUCTION AND QUALITY OF *Thor* PRODUCTS

It's not only what tool you use, but how you use it that governs results, as users of Champion molding machines and core blowers soon learn. There's something about these machines that seems to make it easier to do more work, better work and with less effort. This is well illustrated in these views taken in the foundry of the Hurley Machine Division making castings for Thor washing machines and ironers. Here standard models of Champion core blowers and molding machines are turning out work of a type and in volume that it was thought only special equipment could produce. For back of every Champion machine lies a vast experience in foundry practice, and each detail is designed with the user in mind. This extra thought expressed in a little more weight here, a little extra strength there, greater precision, greater stamina, all adds up to a substantial plus value, realized by the user in terms of speed, ease, accuracy and adaptability to special conditions.

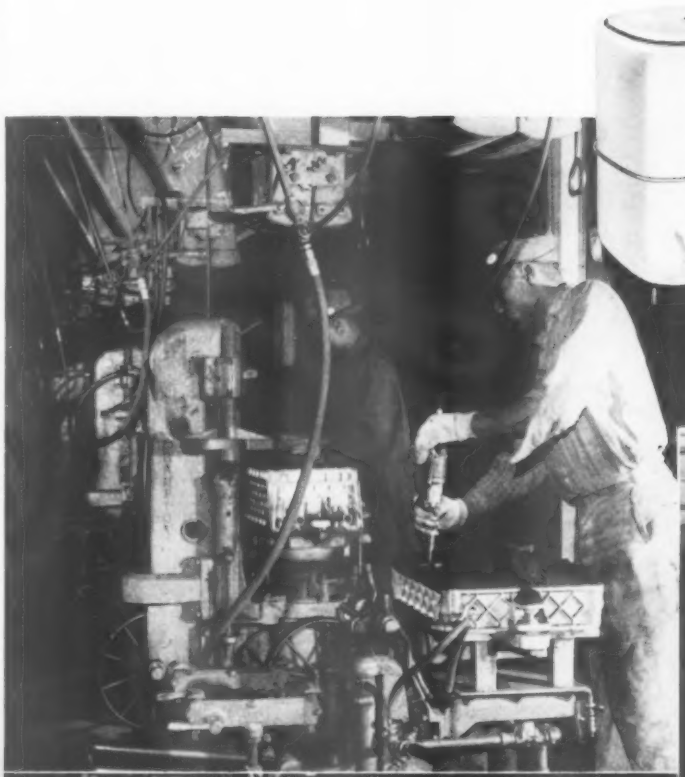
Stand by this CB-10 core blower and watch the cores pile up on the drying rack, and you'll appreciate the "Champion Method." The cope half of the core box is attached to the blower head, and two drag halves are supplied. While one man blows a core, the second places the preceding core in the drier and racks it. More cores per hour, fewer core box parts required, handling reduced to the minimum, are the principal advantages of this example of the "Champion Method."

The standard design of the Champion core blower lends itself readily to the use of the attached cope, though at times a vertically split core box is used on this same machine, illustrating its versatility as a valuable feature.



The core being blown in the machine above is double. Notice the undercuts and the abrupt changes in diameter.

Standard Machines Give Results Equal to a "Special" Set-Up!



The main line of molding machines consists of power jolt, hand roll-over machines for the drag half of the molds, and power-jolt squeeze push-off for the cope. Teamed up in pairs these standard machines enable the operators to keep abreast of the pouring operation and produce results equal to any "special" set-up.

The superior precision of the Champion standard model "J-S" jolt squeezer enables this machine to produce multiple molds for stack-molding of ring castings, of a quality and at a rate ordinarily expected of only a "special" set-up.

CHAMPION FOUNDRY AND MACHINE CO.
1318 W. 21st STREET CHICAGO 8, ILLINOIS

NOW .. YOU CAN MAKE DRY SAND MOLDS FROM GREEN SAND MOLDS . . . IN MINUTES . . INSTEAD OF HOURS . . . WITH

Just THREE Easy-To-Follow Steps

1-MIX IT

DELTA PYRO-KOAT is EASY to mix . . . We'll tell you how.

2-APPLY IT

Spray it on. It covers quickly and uniformly.

3-DRY IT

Just lightly torch it . . or ignite it. DELTA PYRO-KOAT dries immediately producing a uniformly smooth surface . . . highly refractory and waterproof . . . over which molten metal flows freely.

Molds are ready to use anytime within 8 hours after drying.

DELTA PYRO-KOAT wash is especially recommended for the production of STEEL, GREY IRON, MALLEABLE and NON-FERROUS castings.

DELTA PYRO-KOAT WASH

Here's How it Works TO SAVE YOU HOURS OF PRODUCTION TIME.

It's EASY to mix . . . EASY to apply and DRIES QUICKLY and uniformly. DELTA PYRO-KOAT penetrates into the mold and anchors itself from 3 to 5 grains deep. In addition, it waterproofs the molds and anchors the refractory material to the grains of sand, resulting in a thoroughly bonded foundation of high hot-strength and high-refractory properties, producing a smooth casting surface.

Write for a liberal working sample of this new tested-in-use wash. You will receive complete instructions for use.

ANOTHER FAMOUS FOUNDRY FIRST . . BY

DELTA OIL PRODUCTS CO.

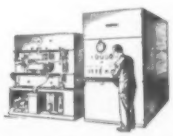
MILWAUKEE 9, WISCONSIN

"This Brass Casting Shakeout Eliminated a Bottleneck For Us!"

HAND CLEANING OF BRASS CASTINGS was a slow, unprofitable method for this large midwestern brass foundry. To step-up production, Allis-Chalmers recommended its 3' x 8' "Aero-Vibe" 2-bearing shakeout, employing a special alloy deck. This arrangement now handles the entire output of the molding floor.

Complete flexibility of application is obtained through a six-position amplitude control and deck slope adjustment and casting pile-ups are prevented by a two foot sloping section of deck at feed end. Small and medium size soft brass castings are satisfactorily cleaned without marking or scuffing. For further information call your nearby A-C Office. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2241

A-C Builds Basic Machines, Blowers, Pumps, Drives, Electrical Equipment For Foundries!



22,000,000 V BETATRON

cuts X-Ray time from hours to minutes. Actually X-rays through 13 inch forging in one minute . . . through 20 inches of steel in 20 minutes!

CUPOLA BLOWERS

Available in all practical sizes. A-C centrifugal blowers can be equipped with air weight control for better cupola economy. Bulletin 1686048A.

SEND FOR NEW BULLETIN

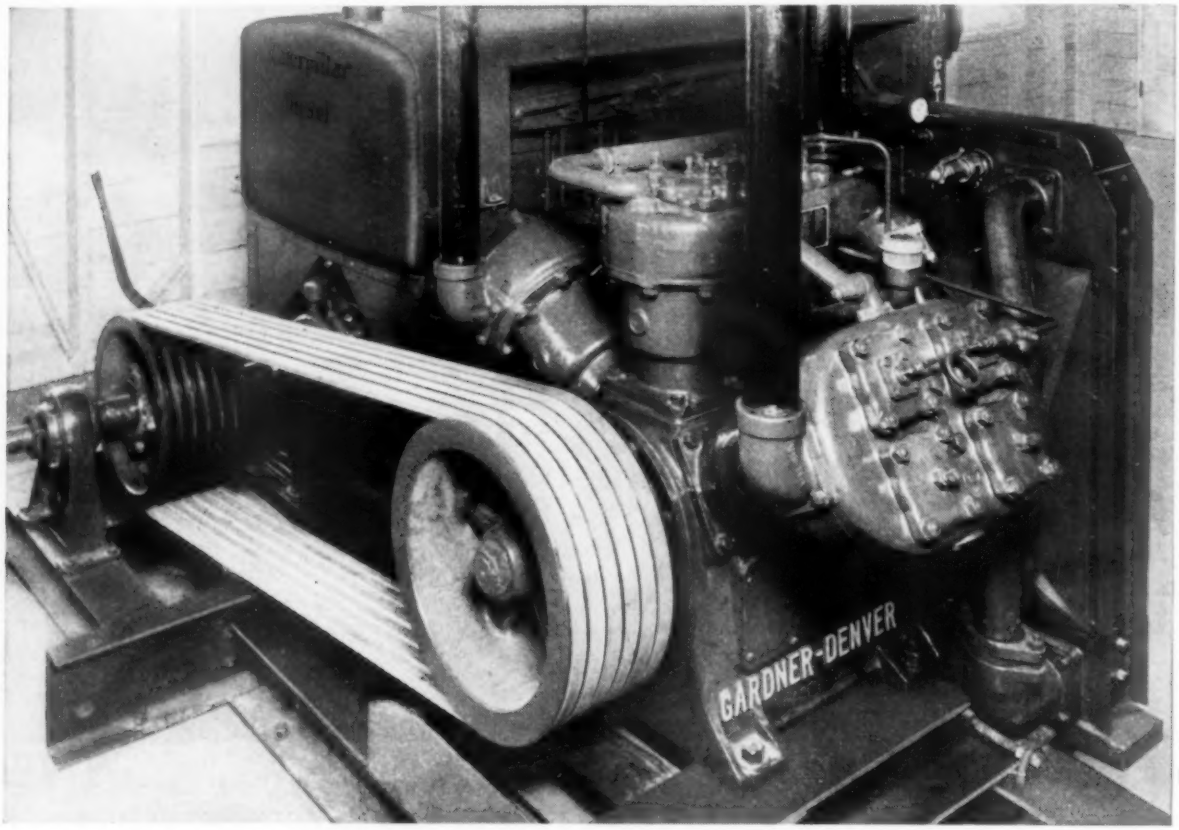
07B6092A, "Foundry Mechanization"—it's packed with helpful, usable information on the entire Allis-Chalmers line of Foundry equipment.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947
A CENTURY OF SERVICE to Industry THAT MADE America Great

What do careful buyers know about this "WB" Compressor?



It's an open secret among buyers that Gardner-Denver Class "WB" Air Compressors, though compact in size and rated as "small machines," develop efficiencies comparable to those of large two-stage horizontal compressors! In other words, *you get more air output in less space — and at low cost.*

The reason? Class "WB" compressors are a departure from conventional design. The use of two small water-cooled cylinders where one large one is ordinarily used results in lower air temperatures — saving in horsepower — considerably reduced inertia load. Other "WB" features you'll value are:

- ✻ *Combination radiator and air-cooled intercooler permits use where cooling water is scarce or of poor quality.*
- ✻ *Completely water-jacketed cylinders for maximum operating efficiency in any temperature or at any altitude.*
- ✻ *Silent "cushioned" Duo-Plate valves.*
- ✻ *Positive pressure system of lubrication from oil pump.*
- ✻ *Timken tapered roller main bearings.*

For complete information, write
Gardner-Denver Company, Quincy, Illinois

USE COMPRESSED AIR FOR SAFETY CONVENIENCE FLEXIBILITY

GARDNER-DENVER

SINCE 1859

EASY WAY TO SELECT *exactly* THE LADLE YOU NEED

The New WHITING LADLE CATALOG FY-144

IT shows ladles of every description—hand ladles, trolley shank ladles, pouring ladles, crane ladles, truck ladles, U-ladles, reservoir ladles.

It includes the new Whiting Pour-Rite Ladles with all-welded construction, air-cooled trunnions, antifriction bearings, self-lubricated gearing.

There are open ladles, covered ladles, geared and hand-tilt ladles, taper side and cylindrical ladles—more than 200 sizes and styles—all fully illustrated and described, with complete specification data.

All are Whiting-engineered by practical foundrymen, and precision-built for dependability and long life. Write for a free copy of Catalog FY-144 . . . keep it handy for quick reference.

WHITING
CORPORATION
15607 Lathrop Avenue, Harvey, Illinois

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2 Outstanding Norton RESINOID WHEELS

Two wheels that give you both a fast, smooth cutting action . . . and long life !

B-5

INTRODUCED a little over a year ago for wheels in the soft and medium hard range, B-5 resinoid bond has been a tremendous success. Operators like the Norton B-5 wheel because it stays sharp—cutting fast and smooth. And grinding costs are down because the fast cutting action is obtained without sacrifice of wheel life. B-5 bond produces a wheel that is mechanically strong and thereby long-lasting.

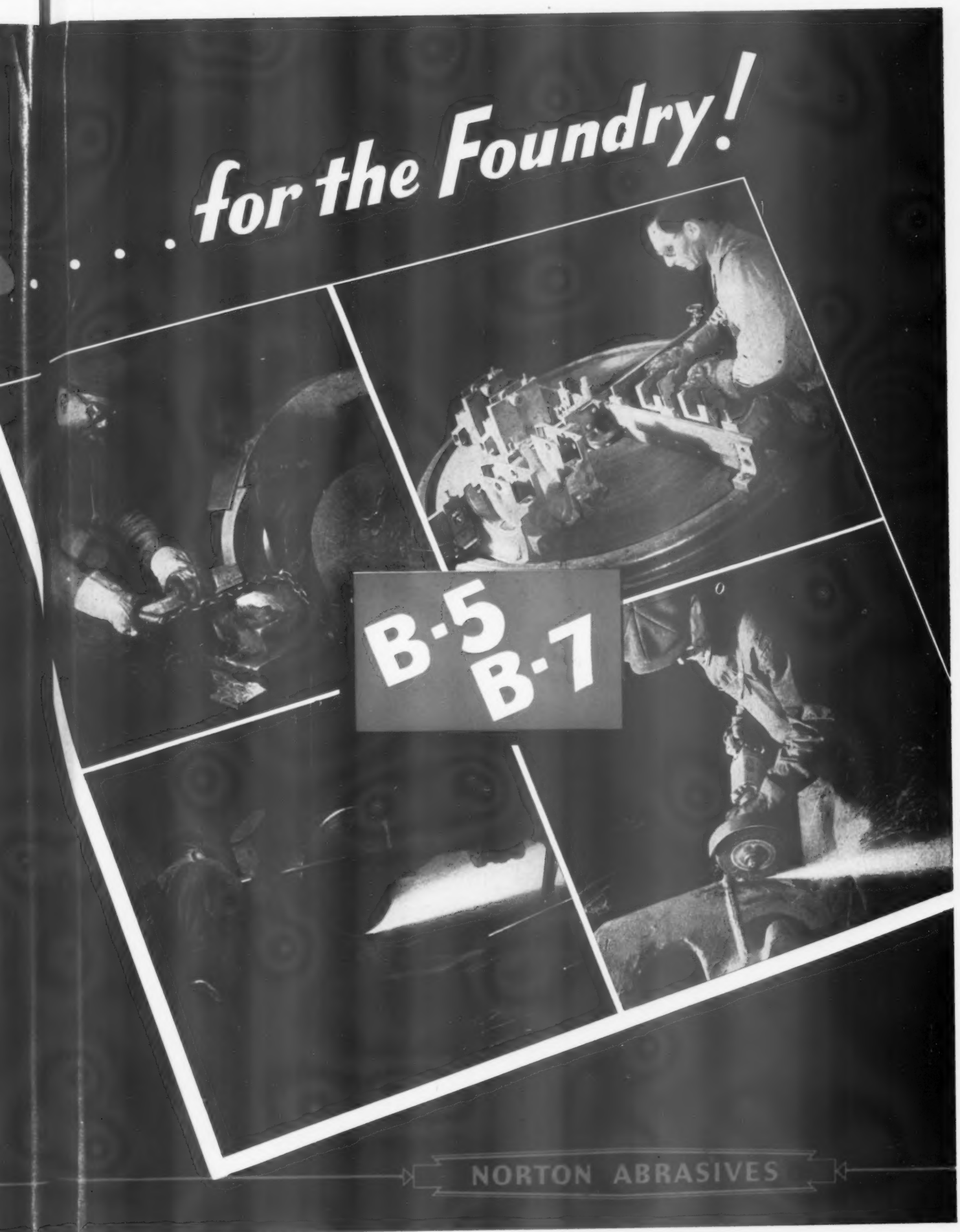
B-7

THIS newest Norton resinoid bond brings to wheels in the hard grades the same combination of fast cutting action and long life which has made B-5 so popular in the softer grades. A stronger and more heat-resistant bond, B-7 is showing remarkable cost-cutting ability on floor stands, swing frames and portable grinders.

Available with all Norton abrasives for foundry wheels, these two outstanding Norton resinoid bonds are bringing lower grinding costs to cleaning rooms everywhere. Call in your Norton abrasive engineer, or the abrasive specialist of your Norton distributor, for specific recommendations.

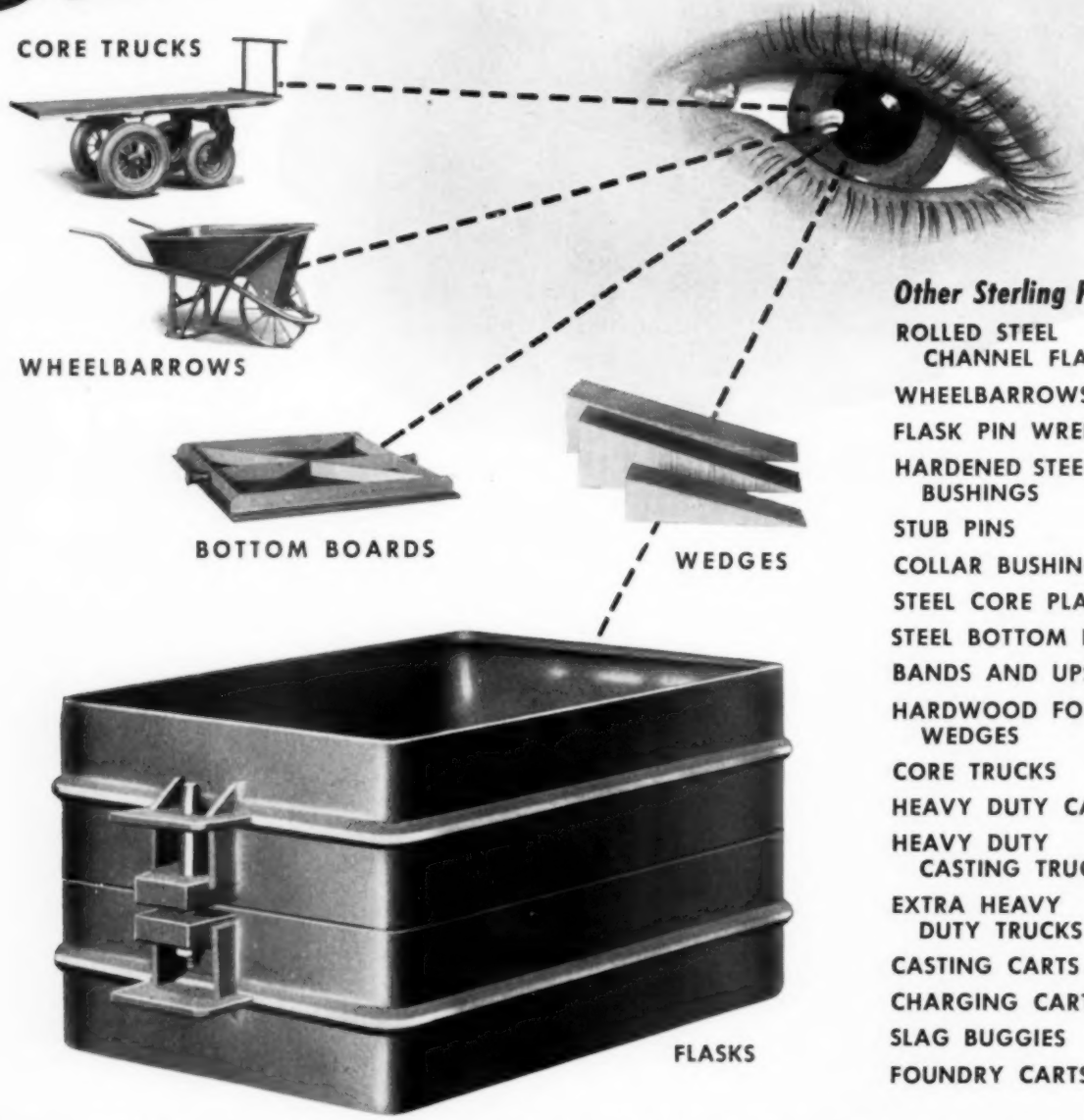
NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities


. . . . for the Foundry!
B-5
B-7
NORTON ABRASIVES

in FOUNDRIES

Sterling is never out of Sight!



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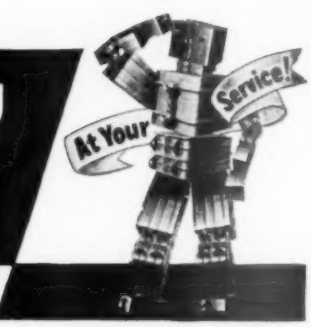
BANDS AND UPSETS
HARDWOOD FOUNDRY WEDGES
CORE TRUCKS
HEAVY DUTY CARTS
HEAVY DUTY CASTING TRUCKS
EXTRA HEAVY DUTY TRUCKS
CASTING CARTS
CHARGING CARTS
SLAG BUGGIES
FOUNDRY CARTS

No matter which way you turn in a modernly equipped foundry you're very apt to see one or more STERLING products. For STERLING has dedicated its facilities to the making of efficient foundry flasks and accessories . . . equipment that is built to endure and that makes your foundry work less strenuous. From the multi-sized flasks in the foundry to the core trucks in the core room STERLINGS can be found speeding up the job and lowering production costs. More than 4,000 American foundries are STERLING customers. For your foundry needs, look to STERLING.

Sterling FOUNDRY FLASKS



STERLING WHEELBARROW COMPANY • Milwaukee 14, Wis., U.S.A.

A 5241-1P

uniform high quality at high speed... savings in new sand and bond... extremely low maintenance costs..."

Resulting from

Mulling the sand every cycle in a *Simpson!*

Repcal BRASS MFG. CO.
PLUMBING · BRASS GOODS
2109-15 EAST 27th STREET
LOS ANGELES 11
CALIFORNIA

March 25, 1947

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549 West Washington Boulevard
Chicago 6, Illinois

Attention: Mr. Otto H. Rosentreter
West Coast Manager
Los Angeles, California

Dear Mr. Rosentreter:

When you called at our plant recently, you inquired regarding the performance of the sand conditioning system which National Engineering Company furnished for our foundry. For your information this equipment has been in daily operation since it was installed in 1940, and its efficient operation has enabled us to achieve production per man far beyond our expectations.

The Simpson Intensive Mixer and auxiliary equipment is giving us the closely controlled and uniform quality molding sand so essential for quality castings at high speed. In addition, it results in substantial savings in new sand and bond.

Maintenance costs have been extremely low on the National Unit. In fact, were I to build a new foundry I would duplicate the present system with no major changes. National has done a highly creditable job in designing and furnishing this equipment for our foundry.

Very truly yours,
Geo. W. Fuller

Geo. W. Fuller
Plant Manager
REPCAL BRASS MFG. CO.

GWF:yw

Manufacturers of the World's Most Complete line of fine Showers

The view showing six of the 12 molding stations at Repcal. Note the new type of mold clamp used in place of conventional weights. These ingenious clamps, designed by Mr. George Fuller, are now manufactured by National, and are available for industry-wide use.

another example of the advantages offered to smaller foundries by SIMPSON *Intensive* MIXERS

• More and more non-ferrous foundries, including numerous smaller operators, are taking advantage of the lower production costs . . . lower operating costs . . . lower maintenance costs . . . less installation space required . . . faster production . . . and the constantly higher product quality available by the controlled mixing of sands in a Simpson Mixer.

A typical example of a small, yet complete sand preparing plant, designed around a Simpson Mixer, is demonstrated at the Repcal Brass Mfg. Co. foundry. This unit combines extreme compactness with ample capacity, flexibility, and simplicity of operation.

Let a National Engineer show you how to step up production, lower costs, and improve the quality of iron . . . steel . . . or non-ferrous castings. Write for details.

MANUFACTURER'S FOUNDRY EQUIPMENT ASSOCIATION, INC.

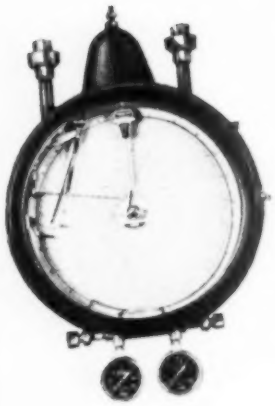
NATIONAL ENGINEERING COMPANY

608 MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

Progressive Foundry Practice Includes These Aids to GREATER EFFICIENCY . . .

• FOXBORO Air-Weight Control



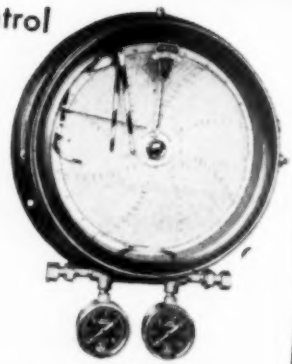
Installed on your present blower . . . whatever the make or type . . . this exclusive Foxboro development will correctly control the blast, properly compensate for varying weather conditions, and make *every day* a good pouring day. Hundreds of leading foundries rely on Foxboro Air-Weight Control, reporting such advantages as better and more uniform quality, fewer rejects, less pigging, fuel saving, greater output, smoother operation.

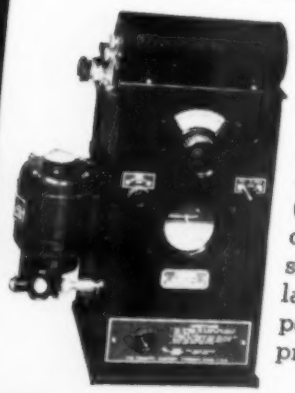
• FOXBORO Wind-Box Pressure Recorder

With this simple, sturdily constructed Foxboro Instrument, you can keep a continuous, close check on operating conditions in the cupola. It will show up any restriction to the blast such as "arching" of the charge, which interferes with proper melting. Its dependable accuracy, and trouble-free performance, are typical of all Foxboro better-engineered instruments.

• FOXBORO Core-Oven Control

Either one of the widely-used instruments will give you continuous, accurate control of temperatures in core ovens. Each assures consistent production of uniform cores and a reduction of baking time to a minimum.



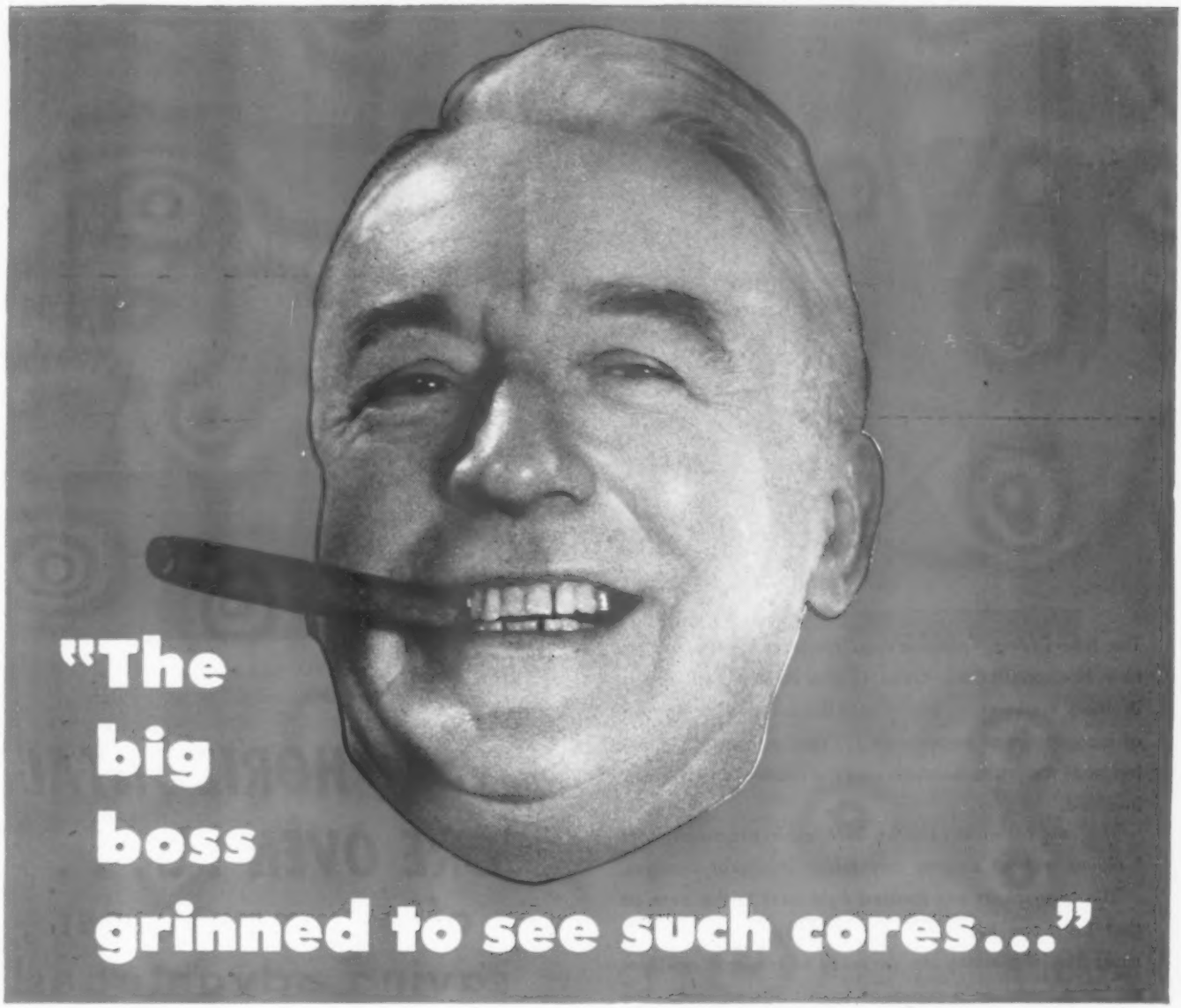


The top controller, of the filled-system type, is either air-operated (as shown) or electrically (Rotax) operated. Provides a continuous record. Bottom instrument is one of the most popular and finest electric operated potentiometer controllers ever produced.

WRITE for complete information on Foxboro Control Systems developed specifically for Foundries. **The Foxboro Company, 32 Neponset Ave., Foxboro, Mass., U. S. A.**

FOXBORO
REG. U. S. PAT. OFF.

RECORDING · CONTROLLING · INDICATING
INSTRUMENTS



"BY GOLLY, the way our core production is improving, I should be laughing right out loud. We're mixing quicker, molding faster, and shaking out in a hurry. We're saving time all the way around. On top of that, our cores are stronger, sharper, and they collapse like punctured balloons. And every batch of cores is darn near perfect. Our reject-record has practically fallen off the chart. How do I account for this improved showing? Well, we've been using Krause Cereal Binders. I guess that's the answer."

Krause Cereal Binders have a valuable job in good coremaking. They supply greater green strength, greater permeability and greater flowability — favored advantages that produce top-quality cores at lower cost. If you prefer a lightweight cereal binder, ask for *Truscor*. If you favor a heavyweight binder, say "Amerikor" to your supplier. You're sure to get the cereal binder you want — in Krause quality. Should there be an irritating molding problem in your core room, phone, write or wire the details to us. We can help you.

CHAS. A. KRAUSE MILLING CO., Milwaukee 1, Wis. • *World's Largest Millers of Dry Corn*

Truscor* AND *Amerikor

CEREAL BINDERS

DISTRIBUTORS

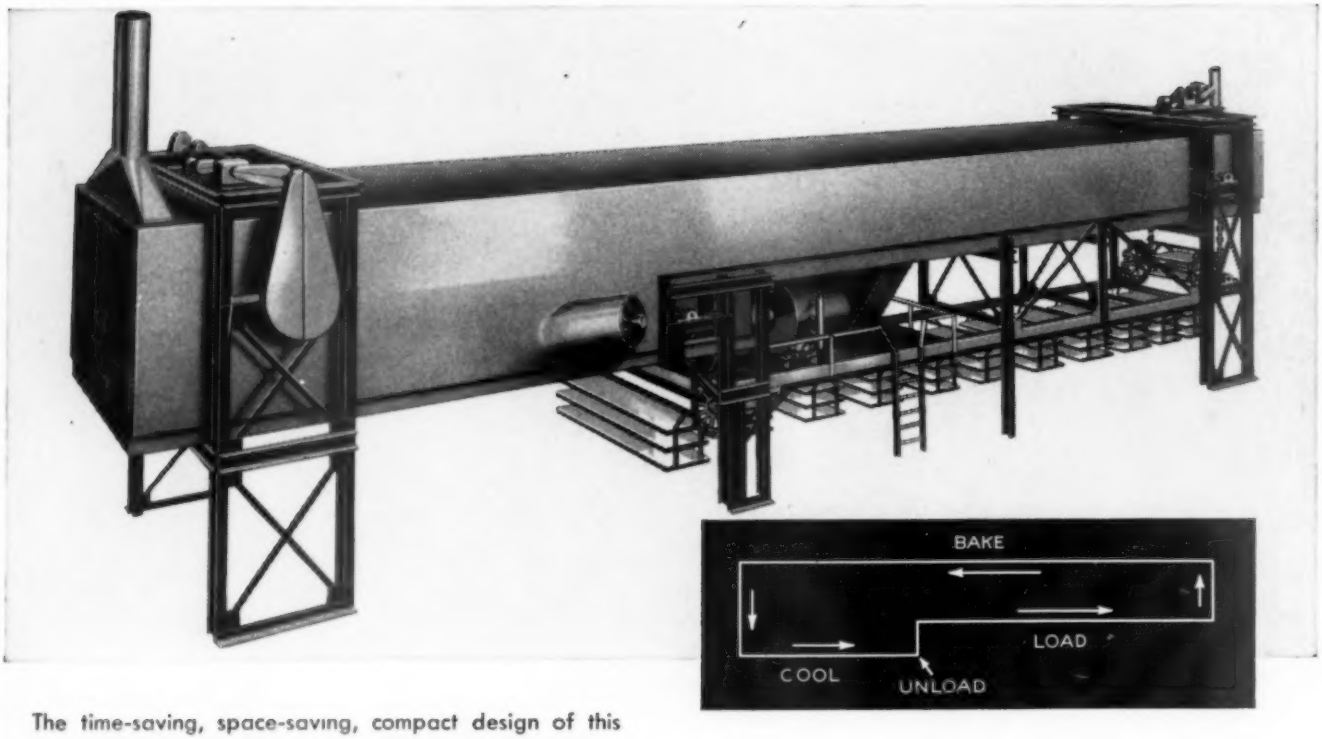
M. A. Bell Co., St. Louis 2, Mo.
A. L. Cavedo & Son, Inc. Richmond 21, Va.
Foundry Supplies Co., Chicago 16, Ill.

J. H. Hatten, Lansdowne, Pa.
Independent Foundry Supply Co., Los Angeles 11, Calif.
Marthens & Co., Moline, Ill.
Carl F. Miller & Co., Seattle 4, Wash.

Milwaukee Chaplet & Mfg. Co., Milwaukee 4, Wis.
Pacific Graphite Works, Oakland 8, Calif.
Porter-Warner Chattanooga 2, Tenn.

Smith-Sharpe Co., Minneapolis 14, Minn.
Frederic B. Stevens, Inc., Buffalo 12, N. Y.
Frederic B. Stevens, Inc., Cleveland 14, Ohio

Frederic B. Stevens, Inc., Detroit 26, Mich.
Western Industrial Supply Co. 208 S. E. Hawthorne Blvd. Portland 14, Oregon



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . . offers many cost saving advantages!

MEMBER

YOUNG BROTHERS COMPANY

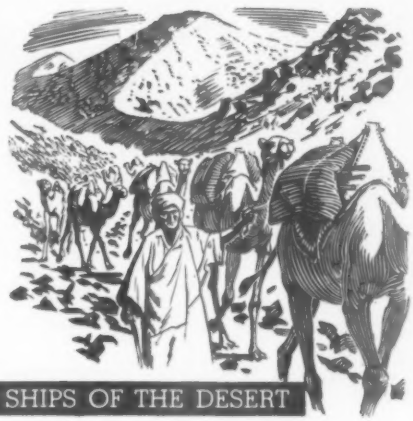
6500 MACK AVENUE DETROIT 7, MICHIGAN

ESTABLISHED IN 1896

THE STORY OF CHROMIUM

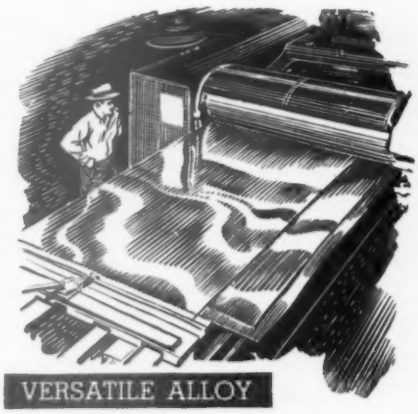
COLOR FOR ARTISTS

1 The yellows, blues, and violets of the artist's palette; the red of the ruby, the green of the emerald—all come from chromium, a metal named from the Greek word *chroma*, meaning color. Discovered in 1797, this metal was for years just a laboratory curiosity, but is now top-ranking among alloys.



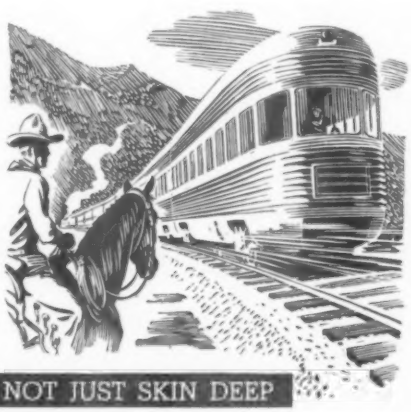
SHIPS OF THE DESERT

2 Caravans of camels laden with chromite ore have often formed the first link on an assembly line thousands of miles long. From the mines of Rhodesia, Turkey, Russia, and India this valuable ore starts its long journey to Electromet furnaces, where dozens of different types of chromium alloys are produced.



VERSATILE ALLOY

3 This silvery-white metal, used with steel and iron in amounts from 1 to 35 per cent, imparts many of its own desirable properties. To stainless steels, chromium gives resistance to heat, rust, and corrosion—to heat-treated steels, strength and resistance to shock—to cast iron, hardness and wear resistance.



NOT JUST SKIN DEEP

4 The luster of stainless steel withstands all weather conditions—on streamlined trains as well as on skyscrapers. For hospital, food, and dairy equipment, too, this steel is popular, since it is so easy to clean and sterilize. And for the oil and chemical industries, its resistance to corrosion and heat makes it ideal.

BEARINGS TO BATTLESHIPS

5 Axles and armor plate, dies and drills, shafts and springs—these are made from engineering steels that must have the hardness and strength necessary to withstand wear and strain. That's why engineers specify steels with 1 to 3 per cent chromium for applications where dependability is essential.

It's Been A Long Time

. . . since Electromet started to produce ferro-alloys — 40 years ago. In fact, as far back as 1897, a plant in Virginia, which later joined Electromet, was the first to produce ferrochrome commercially in the United States. Electromet is constantly developing new and better alloys, among them the low-carbon ferrochrome essential in the production of stainless steels. You will learn more about chromium and other alloys by writing to our Technical Service Department for the booklet, "Electromet Ferro-Alloys and Metals."

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
TRADE-MARK
Ferro-Alloys & Metals

Special Announcement BY Tabor

5 new desgn

HERE are four machines you foundrymen invariably put "on the spot"—the top-speed, high production, don't-let-me-down spot. That's a tough assignment, calling for a tough machine!

So, Tabor engineers figure that nothing less than the *best* design will do for these vital molding units. From experience—63 years of it—they know what you want, *and here are the results:*

1. The squeezing unit, including guide, is completely enclosed—full protection against dirt and dust.
2. There are no piston rings on the squeeze mechanism—a source of down-time and maintenance expense gone.
3. Wear on squeeze cylinder is so reduced that it won't be necessary, within the conceivable life of the machine, to re-bore or replace this part.
4. It's now impossible, under any circumstances, for the squeeze piston to blow out—an invaluable safety feature.
5. Entire squeezing or jarring unit may be quickly detached from the machine—allows easy access for inspection.

Decide now to give your own production schedule the advantages of these well-engineered Tabor innovations.

MOST TYPES OF THESE MACHINES ARE IMMEDIATELY AVAILABLE FROM STOCK.

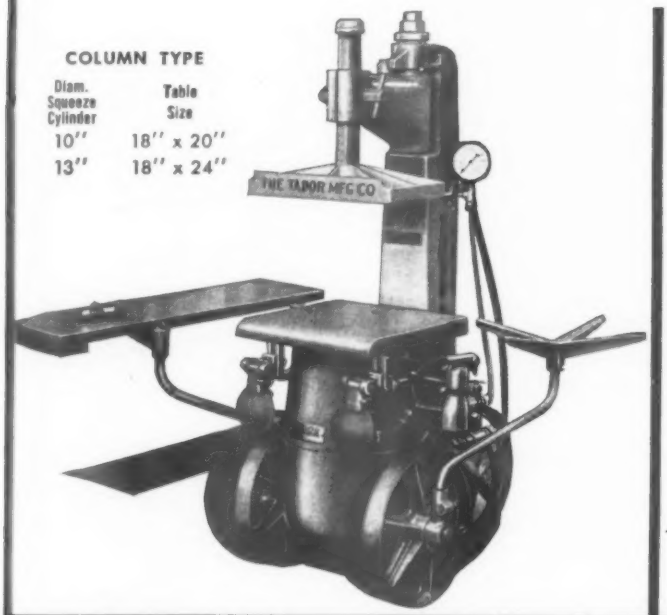
REPRESENTATIVES

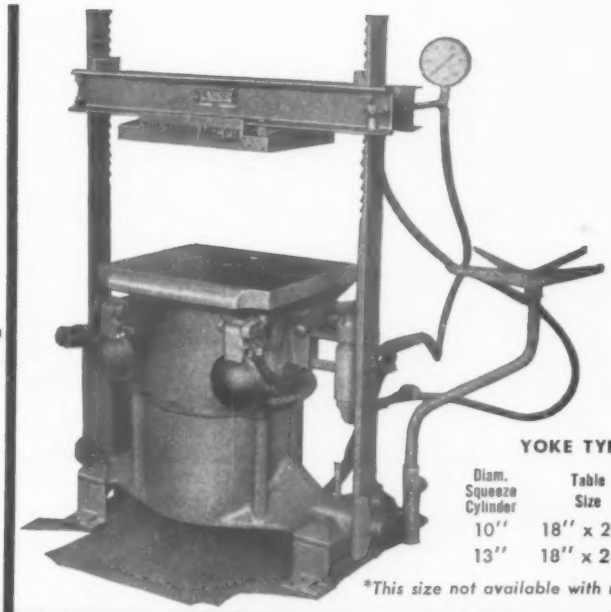
SNYDER FOUNDRY SUPPLY COMPANY, LOS ANGELES, CALIFORNIA • GALLAGHER FOUNDRY SUPPLY COMPANY, SAN FRANCISCO & OAKLAND, CALIFORNIA • CARL F. MILLER & COMPANY, SEATTLE, WASHINGTON • M. W. WARREN COKE COMPANY, 1017 OLIVE STREET, ST. LOUIS 1, MISSOURI • E. R. FROST CO., INC., MINNEAPOLIS 14, MINNESOTA

design features mean lowest maintenance . . . longest life for these Jar Squeezers

COLUMN TYPE

Diam. Squeeze Cylinder	Table Size
10″	18″ x 20″
13″	18″ x 24″





YOKE TYPE

Diam. Squeeze Cylinder	Table Size	Space Between Uprights
10″	18″ x 20″	32″
13″	18″ x 24″	36″*

**This size not available with new features*

TOP-SQUEEZE TYPE

Diam. Squeeze Cylinder	Table Size
10″	16″ x 19″

(Also available in portable or portable sand-straddler types)

CANTILEVER TYPE

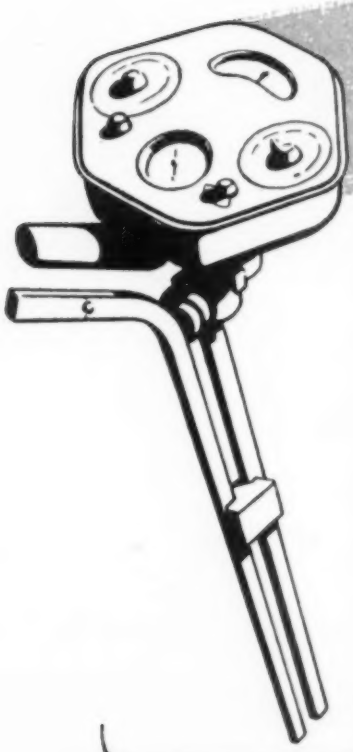
Diam. Squeeze Cylinder	Table Size
10″	18″ x 20″
13″	18″ x 24″

The TABOR *Manufacturing Co.*

SINCE **1884** MANUFACTURERS OF FOUNDRY MOLDING MACHINES

6225 TACONY STREET • PHILADELPHIA 35, PENNA.

MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT



Moistmeter

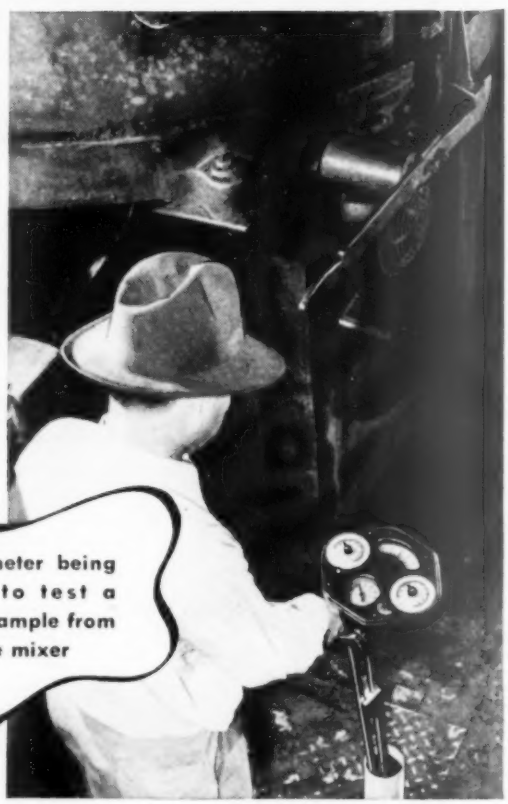
Fast • Portable • Accurate—Electric Moisture Tester FOR THE FOUNDRY

The Moistmeter is a versatile instrument that determines instantly the exact moisture percentage of either core or molding sand, on the floor or in the sand system.

It is ruggedly constructed, simple to operate and easy to carry around. Moisture readings can be taken at selected depths, from either a pint can or a large bin in just three seconds.

When you equip each sand preparation crew with the Moistmeter, you can control the moisture range within exactly specified limits with considerable improvement in your castings.

Moistmeter testing moisture of sand on the foundry floor.



Moistmeter being used to test a sand sample from the mixer

Write to Department "E"

HARRY W. DIETERT CO.

9330 ROSELAWN AVE., DETROIT 4, MICHIGAN

SAND • MOLD • MOISTURE • SULPHUR • CARBON

CONTROL

FISHER

builds a

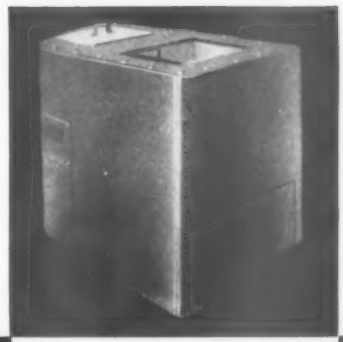
complete line of

melting and holding furnaces . . .

oil

gas

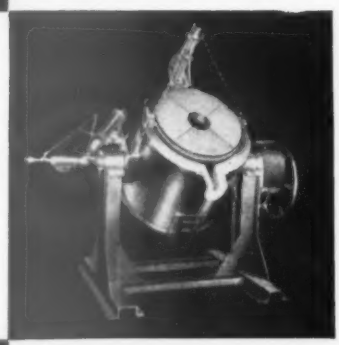
electric

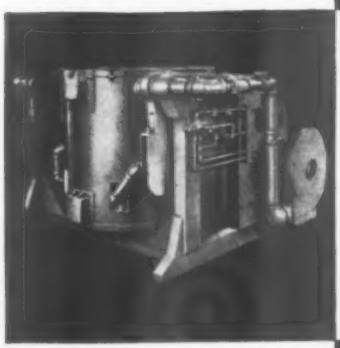


Lindberg-Fisher electric induction melting and holding furnace. For aluminum and other non ferrous alloys.

Open flame furnace. Oil or gas fired. Capacities up to 40,000 lbs. brass.

Hand Tilting Crucible Furnace. Gas or oil fired. For brass, bronze, yellow brass, copper-nickel alloys. Capacity—#40 to #400 crucible.





Hydraulic (or motor) Tilting Crucible Furnace. Oil or gas fired. For brass, bronze, aluminum, magnesium and rare metals. Capacities #60 to #1000 crucible.

Iron pot melting and holding furnace. Gas, oil, or electrically heated. For aluminum, tin, lead, zinc, kirksite, and other low melting alloys. Capacity to 3000 lbs. aluminum, or equivalent.

Aluminum diecasting furnace. Oil or gas fired. For ladling. Crucible sizes #250 to #1000.

Floor Mounted crucible furnace. Gas or Oil fired. For copper brass, bronze, copper nickel alloys, aluminum and other non ferrous alloys. Capacity #20 to #400 crucible.

For further information request:

Bulletin 550 covering the complete Fisher line
Bulletin 28A "Simplex Metal Melting and Refining Furnace"
Bulletin 57A "Fisher Motorized and Hydraulic Tilting Furnaces"
Bulletin 101A "Fisher Melting Furnaces for White Metals"
Bulletin 300A "Fisher Aluminum Melting Furnaces"
Bulletin 400 "Hand Tilting Crucible Melting Furnace"
Bulletin 500 "Fisher Magnesium Melting Holding and Alloying Furnaces"
Bulletin 510 "Lindberg-Fisher Electric Induction Melting and Holding Furnaces"

Lindberg-Fisher electric induction melting furnace. For aluminum and other non ferrous alloys.

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

2453 WEST HUBBARD STREET • CHICAGO 12, ILLINOIS

*LESS "DOWN-TIME"
MORE PRODUCTION TIME

SWINDELL
ELECTRIC ARC
MELTING FURNACES

*Have a SWINDELL engineer give you the facts.

SWINDELL-DRESSLER Corporation
DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES
PITTSBURGH 30, PA.

The Pittsburgh Steel Foundry Corp.

OF GLASSPORT, PA.

• . . . does a 100 hour job in 44 minutes

AIRCO TECHNICAL SALES SERVICE REPORT

PROBLEM: To remove this 52-inch, 7-foot high riser from a 50-ton cast steel anvil block.

SOLUTION: We recommended cutting with an Airco No. 40 Radiagraph equipped with a Style 6740 water-cooled torch. Two cuts were made; the first five inches from the finish line. Then, after inspection (no defects were visible), the second and last cut was made one inch from the body of the block. This entire job was completed in 44 minutes.

Pittsburgh Steel Foundry Corp. estimates flame cutting to this close tolerance permitted a saving of approximately 100 hours machining time.

R. J. Helenkamp

Airco Technical Representative

Airco's Technical Sales Division is at the call of all industry in applying Airco processes and products in the solution of their problems. If you have a metal working problem, ask to have a Technical Sales Division man call. Address: Dept. F- 6910, Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., Houston 1, Texas.

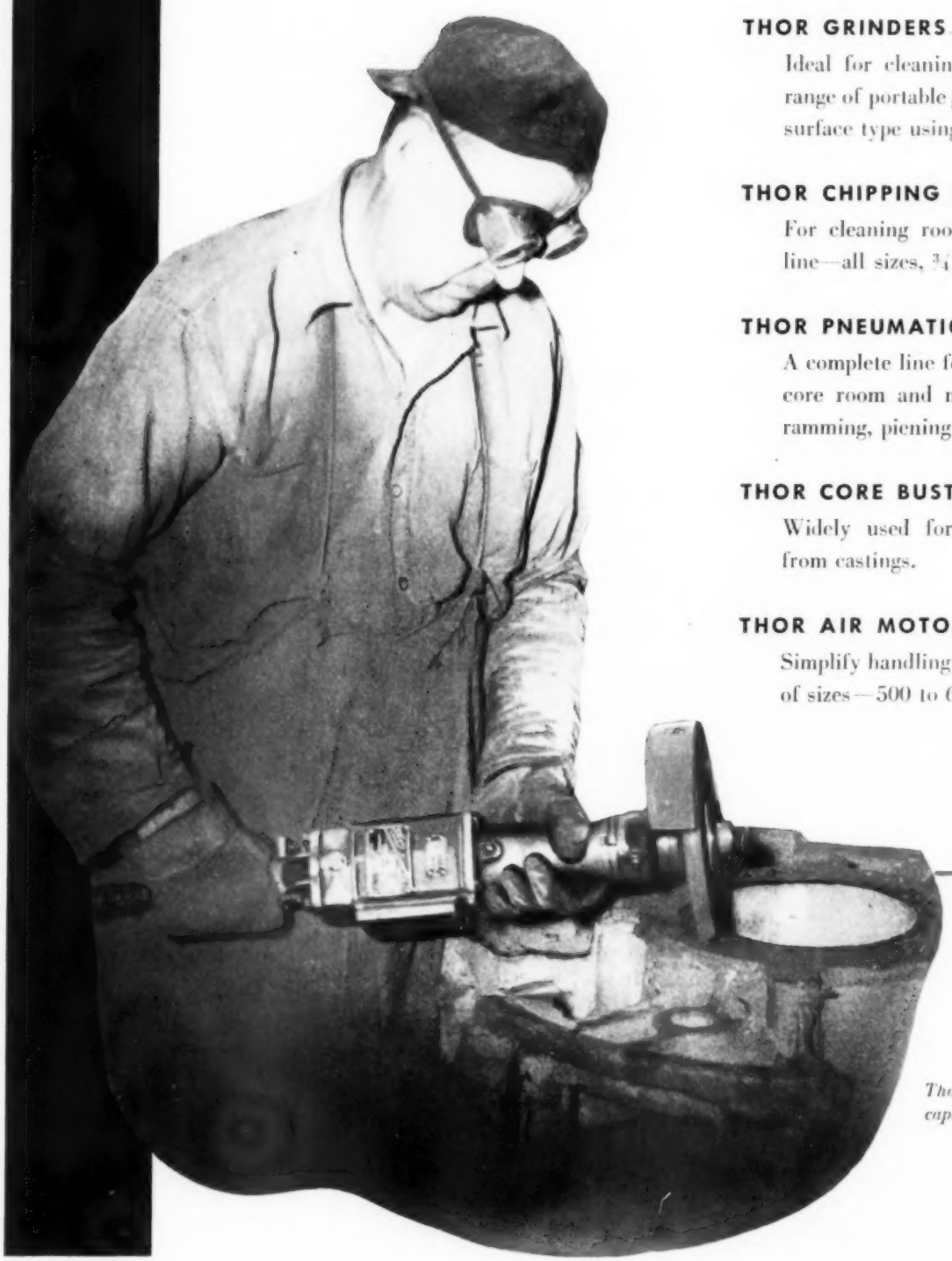
AIRCO AIR REDUCTION

Offices in All Principal Cities

TECHNICAL SALES SERVICE—ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

TOP OUTPUT.....

Modern Thor Tools....



THOR GRINDERS

Ideal for cleaning room use. Complete range of portable grinders, radial type or surface type using cup grinding wheels.

THOR CHIPPING HAMMERS

For cleaning room chipping. Complete line—all sizes, ¾" to 4" stroke.

THOR PNEUMATIC RAMMERS

A complete line for floor or bench work; core room and molding machine sand ramming, piening and butting off.

THOR CORE BUSTERS

Widely used for knocking out cores from castings.

THOR AIR MOTOR HOISTS

Simplify handling flasks. Complete range of sizes—500 to 6,000 pounds capacity.

Thor 360 Grinder in wheel capacities from 4" to 8".

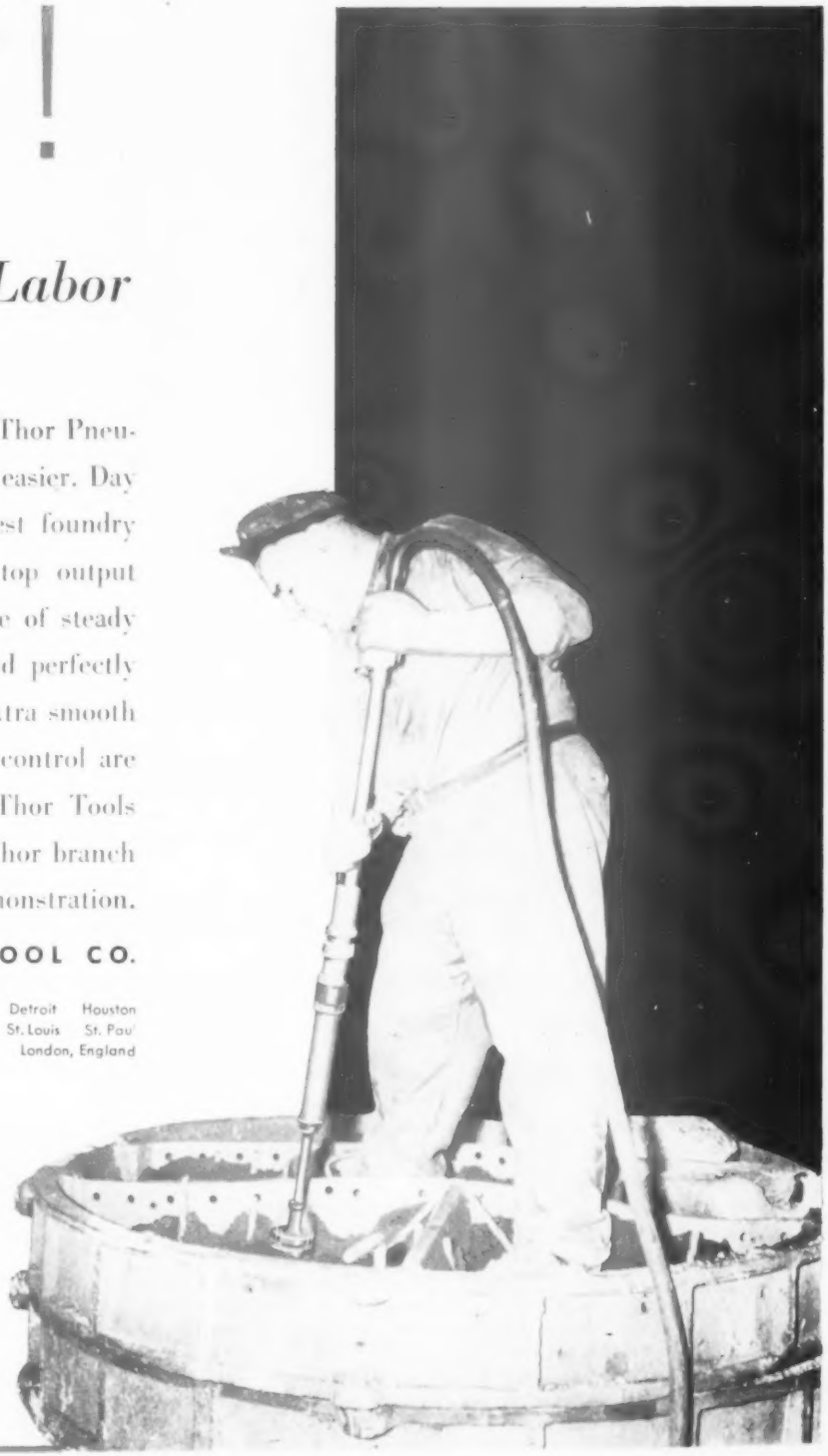
...DAILY!

...*Save Time and Labor*

When jobs are toughest, powerful Thor Pneumatic Tools get work done faster and easier. Day after day, they stand the gaff of hardest foundry usage—with tremendous capacity for top output at minimum labor cost. With abundance of steady power, Thor Tools are light weight and perfectly balanced for easier handling . . . and extra smooth operation. Instant starting and positive control are plus features. Prove to yourself why Thor Tools are favored by foundries. Your nearby Thor branch will arrange a practical on-the-job demonstration.

INDEPENDENT PNEUMATIC TOOL CO.
600 W. Jackson Blvd., Chicago 6, Ill.

Birmingham Boston Buffalo Cincinnati Cleveland Denver Detroit Houston
Los Angeles Milwaukee New York Philadelphia Pittsburgh St. Louis St. Paul
Salt Lake City San Francisco Toronto, Canada London, England



Thor Floor Rammer in Action.

... Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

Handle it Cheaper & Faster with a HOUGH "HUFF" Payloader PATENTED

GENERAL FOUNDRIES CO. Saves Time . . . Money . . . Manhours . . . and Increases Production!

Working 18 hours per day — 6 days per week — a Hough Payloader is doing a "gang-size" job for General Foundries Company, Milwaukee, Wisconsin. Hauling and loading slag, waste sand and cores; waste sand from the blast cleaning room; heaping molding sand for the sand cutter; unloading and piling scrap — all over the foundry the sturdy Payloader is effecting tremendous savings in man hours, time and money.

Cuts Slag Handling Time 600%
Loading 5 yard trucks from temporary pile. Round trip haul 325 feet. Previously took 5 men and wheelbarrows 1½ hours to load 5 yard truck. Payloader handles same job in 15 minutes. Cuts time 600%, saves 7¼ manhours per truck load.

Saves 17½ Manhours Handling Sand
Payloader windrows sand on molding floor in preparation for sand cutter. The Payloader and one man pile sand on 23 molding floors in 30 minutes. This same operation formerly took 12 men 1½ hours with shovels and wheelbarrows.

From beginning to end in foundry operation, the Hough Payloader has proved itself an indispensable work-horse on wheels. You too can profit from the very profitable experiences of the hundred and fifty foundry operators now using Payloaders — put a Payloader in your foundry for greater efficiency, lower operating costs and increased production.

Send for Bulletin 164 on the Model HA Payloader.

PROVEN OVER 6500 HOUGH TRACTOR SHOVELS BUILT PERFORMANCE

HA moves temporary piles of scrap.

Waste sand being loaded into disposal trucks.

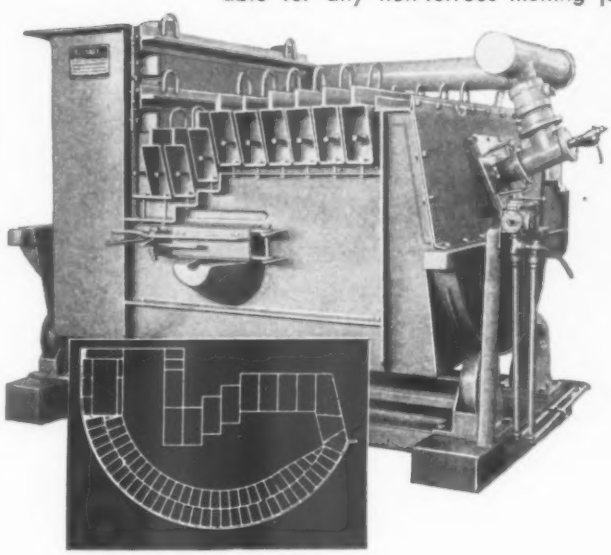
MATERIAL HANDLING EQUIPMENT SINCE 1920

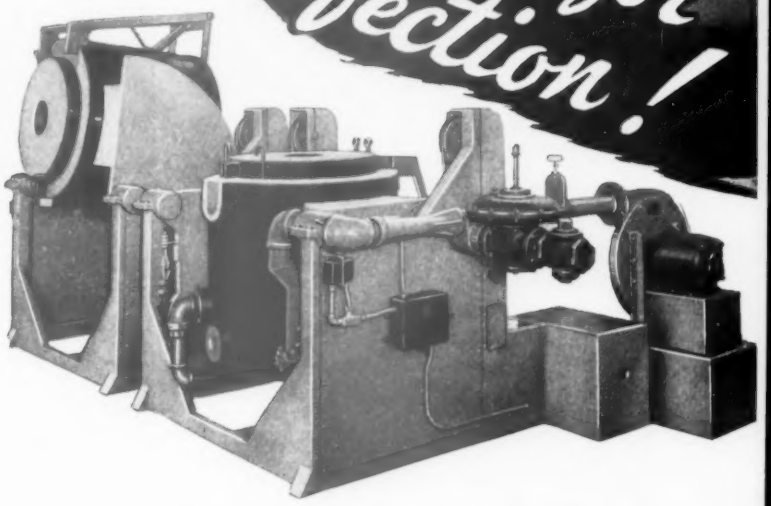
THE FRANK G. HOUGH CO.

703 Sunnyside Ave., Libertyville, Illinois

STROMAN FURNACES are Engineered for Perfection!

When you install a Stroman Furnace in your foundry, die casting or permanent mold plant you will be astounded at its extremely efficient operation . . . great economy in fuel consumption...speed of melting time and ease of handling. Stroman Furnaces have proved themselves to be the best available for any non-ferrous melting job. Write today for complete information





SKLENAR FURNACES

For melting Brass, Bronze or Aluminum, Sklenar Non-Crucible, Direct Fired, Reverberatory Melting Furnaces, are the fastest ever built. Their Design is unique. Metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will show fuel savings up to 40%; as the combustion chamber is heated by the same fuel that is used to melt the metal at the throat of the hopper. They are also very successful in the making of Grey Iron Castings. The furnace illustrated is the 1200 lb. (brass capacity) size, and is oil fired. Gas fire is also available. Full information upon request.

STROMAN MECHANICAL OR HYDRAULIC TILT CRUCIBLE MELTING FURNACES

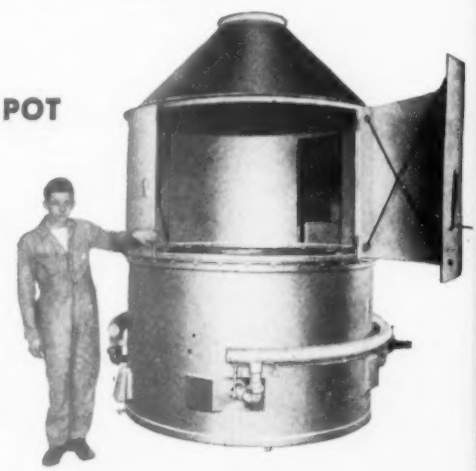
For Brass, Bronze, Aluminum and other non-ferrous metals. These Stroman Furnaces embody the famous Stationary Lip Pour Feature which assures a constant pouring arc, eliminating the necessity of moving the ladle at any time during a pour. They are excellent for use in permanent mold and die casting plants as well as any foundry. Their sturdy construction assures longest life, and their economical operation results in lowest production costs. Choice of oil or gas fire. Built in sizes to handle capacities from No. 125 to No. 400 crucible.

STROMAN CRUCIBLE STATIONARY MELTING FURNACES

For Brass, Bronze, Aluminum and other non-ferrous metals. Sturdy, efficient and featuring the Stroman Push-Back Cover these stationary furnaces are designed for peak production and greatest fuel economy. Oil or Gas Fire. Capacities from No. 20 to No. 400 crucible.

STROMAN IRON POT STATIONARY MELTING FURNACES

These furnaces are highly recommended as break down furnaces for zinc die casting plants. They also excel as aluminum holding furnaces. They can be supplied with or without hoods to exhaust fumes and heat. Their construction assures longest pot life and lowest fuel costs. Choice of manual or automatic controls and gas or oil fire. Capacities from 212 to 14,000 lbs. of zinc. Other metals in proportion.

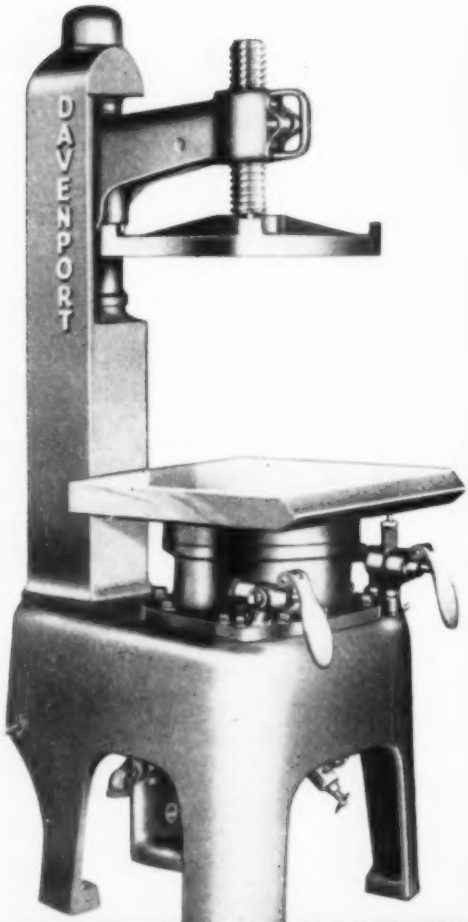


Write for Complete Information at Once

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.



"Squeeze Play"

Squeeze plays on the diamond cannot always be *safe*. In everyday foundry production a squeeze play must be a sure thing!

With the NEW, MODERN Davenport Jolt Squeeze you eliminate all chance.

Write today for your box score showing the nine outstanding Davenport features.

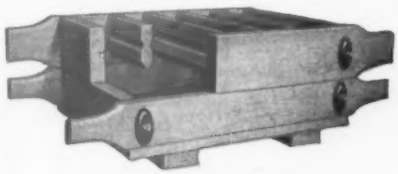
DAVENPORT MACHINE AND Foundry Company

DAVENPORT IOWA U. S. A.

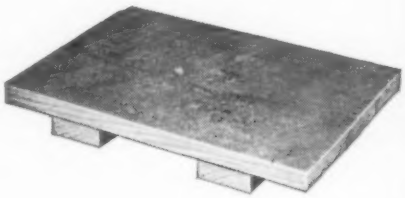
Indians vs. Detroit—Hegen slides—Feller with bat—Cleveland News Photo

CMD FOUNDRY SPECIALTIES

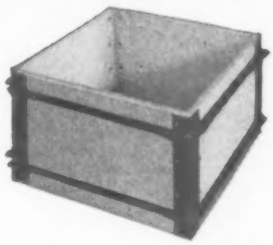
WEDGES
Hard or soft wood



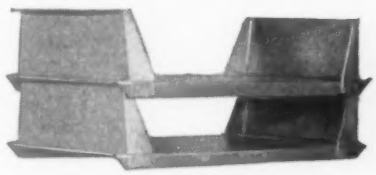
CMD WOOD FLOOR FLASKS
All sizes and shapes



CMD WOOD BOTTOM BOARDS
All sizes and shapes



CMD NON-WARP, NON-BURN SLIP JACKETS



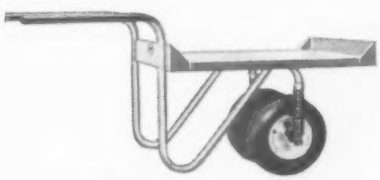
CMD DUAL-PURPOSE CORE TRAYS

CMD TYPE F CHIPPING HAMMER
Metal handle. Head has 2 chisels at right angles

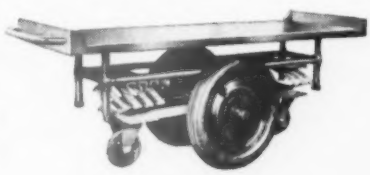
CMD TYPE C CHIPPING HAMMER
Combination drift and chisel

CMD TYPE A CHIPPING HAMMER
For general hand chipping

TEXTITE AIR SEPARATOR
Cools, cleans and dries the air in one operation. *No moving parts.* Saves air tools. Nothing to replace.



CMD PNEUMATIC CORE BARROWS
With single wheel or two wheels. (as shown here)

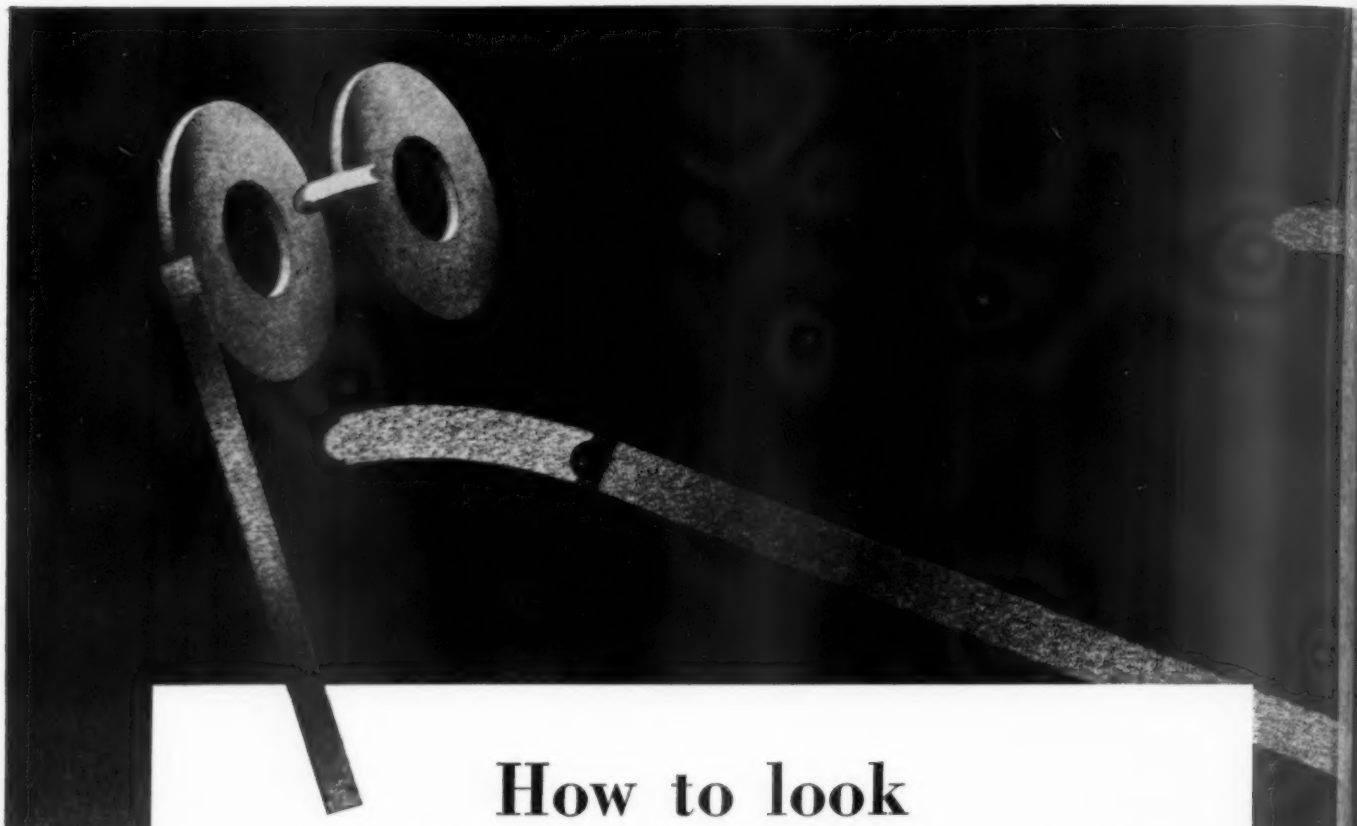


CMD PNEUMATIC CORE TRUCKS
Minimize core chafing and breakage

WRITE FOR BULLETINS
On CMD core-conveying equipment and other foundry specialties—preferred by experienced foundrymen for 25 years.

CHICAGO MANUFACTURING & DISTRIBUTING COMPANY

1928 WEST 46th STREET CHICAGO 9, ILLINOIS



How to look for lower grinding costs

Dollar losses in your grinding operation may be eating into your profits without your seeing the reasons why.

Here's a way to eliminate such losses —a way that has already saved a lot of money for men in your own industry.

Let Peninsular Engineers give your grinding a thorough study. This study will include careful analysis of your equipment, the material to be ground, and all other factors that influence grinding costs. From results learned, Peninsular will give you job-designed grinding at substantial savings in dollars.

Since 1889, Peninsular Engineers have specialized in grinding problems. And in almost every case, *they have cut production expenses appreciably.*

The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

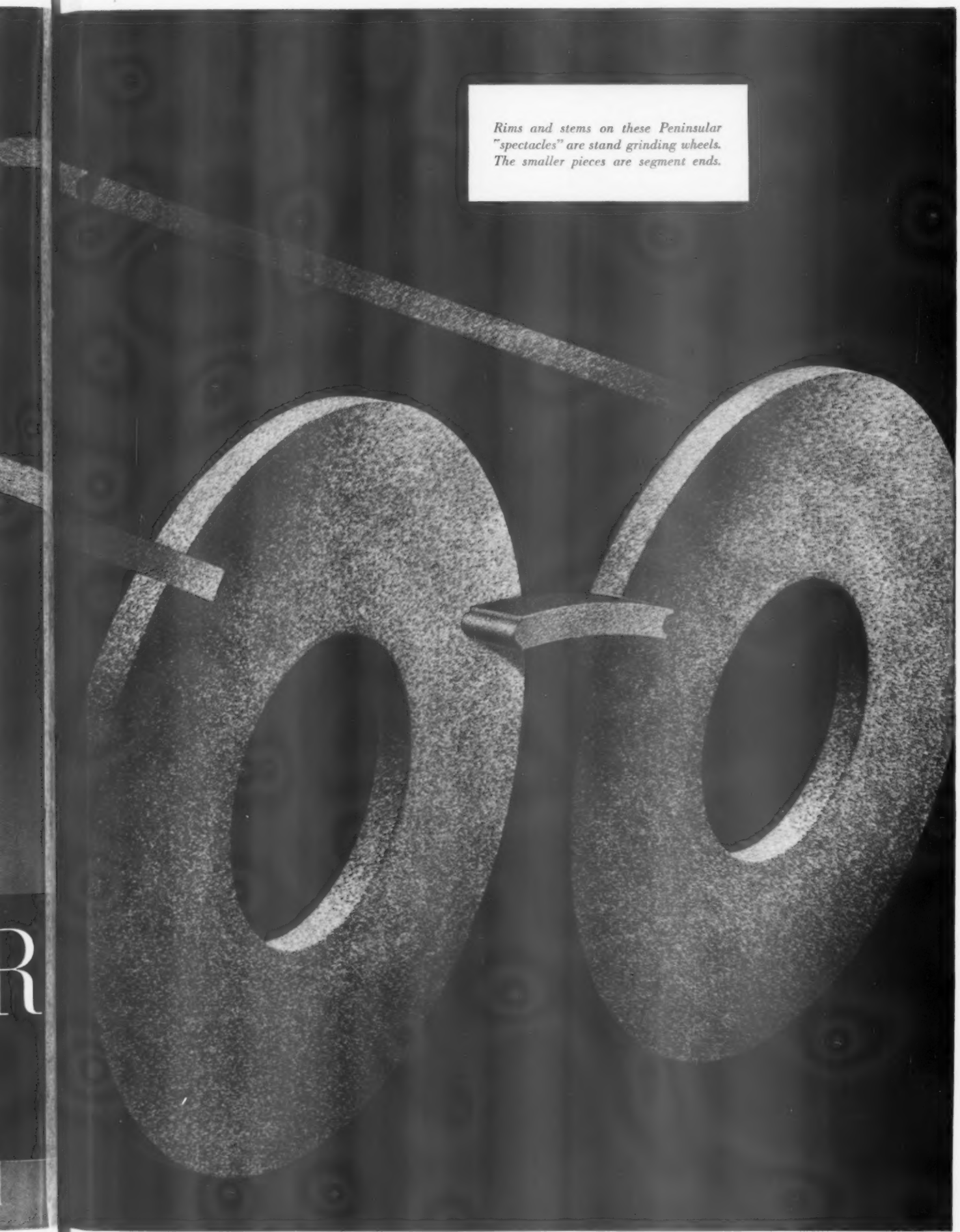
PENINSULAR

INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS



Rims and stems on these Peninsular "spectacles" are stand grinding wheels. The smaller pieces are segment ends.

G-IRON* assures quality castings for Sweets Foundry, Inc. Johnson City, N. Y.

THESE castings, of varying sections, were poured from the same base metal without the use of alloys. G-IRON is used to produce sound castings over a wide range of metal thickness. The finely distributed graphite increases fluidity and reduces chill in thin sections—improves machinability and helps overcome shrinkage and porosity between thin and heavy sections.

*G-Iron is graphitized pig iron

TONAWANDA for sound Castings

TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

20% LOWER COSTS

Jobs like the cleaning of cored holes in blower housings were being done with 6″—6,000 R.P.M. grinders, weighing 11½ lbs., with 2¾″ diameter cone wheels in this gray iron foundry. Wheel loss was excessive. The Rotor Application Engineer suggested a Rotor Model D-77—8,500 R.P.M. cone grinder weighing only 9 lbs., and demonstrated this tool on the job. The changeover gave these returns:

20% lower grinding costs because:

Higher surface speed of the cone wheel removed the metal faster. Lighter weight of tool makes it easier to handle.

Additional savings:

One-third less wheel cost due to higher wheel speed under load.

There is no obligation for a similar study of *your* portable tool operations with the idea of cutting your grinding costs.

Yours for the right tool,

AIR O'TOOL

SIMONDS ABRASIVE CO.

GRINDING WHEELS

for Fast Production, Low Cost

Fast cutting action teams up with long wheel life to give you maximum grinding efficiency with Simonds Abrasive Wheels. When grinding wheel performance is the determining factor specify Borolon abrasive for steel . . . Electrolon abrasive for cast iron . . . Resinoid bonded for high speed grinders . . . Vitrified bonded for regular speeds.

Try Simonds Abrasive Wheels on the "business end" of your portable grinders . . . popular sizes include 8" x 1" x ⅜", 6" x 1" x ⅜" and 6" diameter Rotor type cup wheels. Send for our Grinding Wheel Data Book for specific grain and grade recommendations and the name of your nearest Simonds Abrasive Distributor.

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is a division of
SIMONDS SAW AND STEEL CO.
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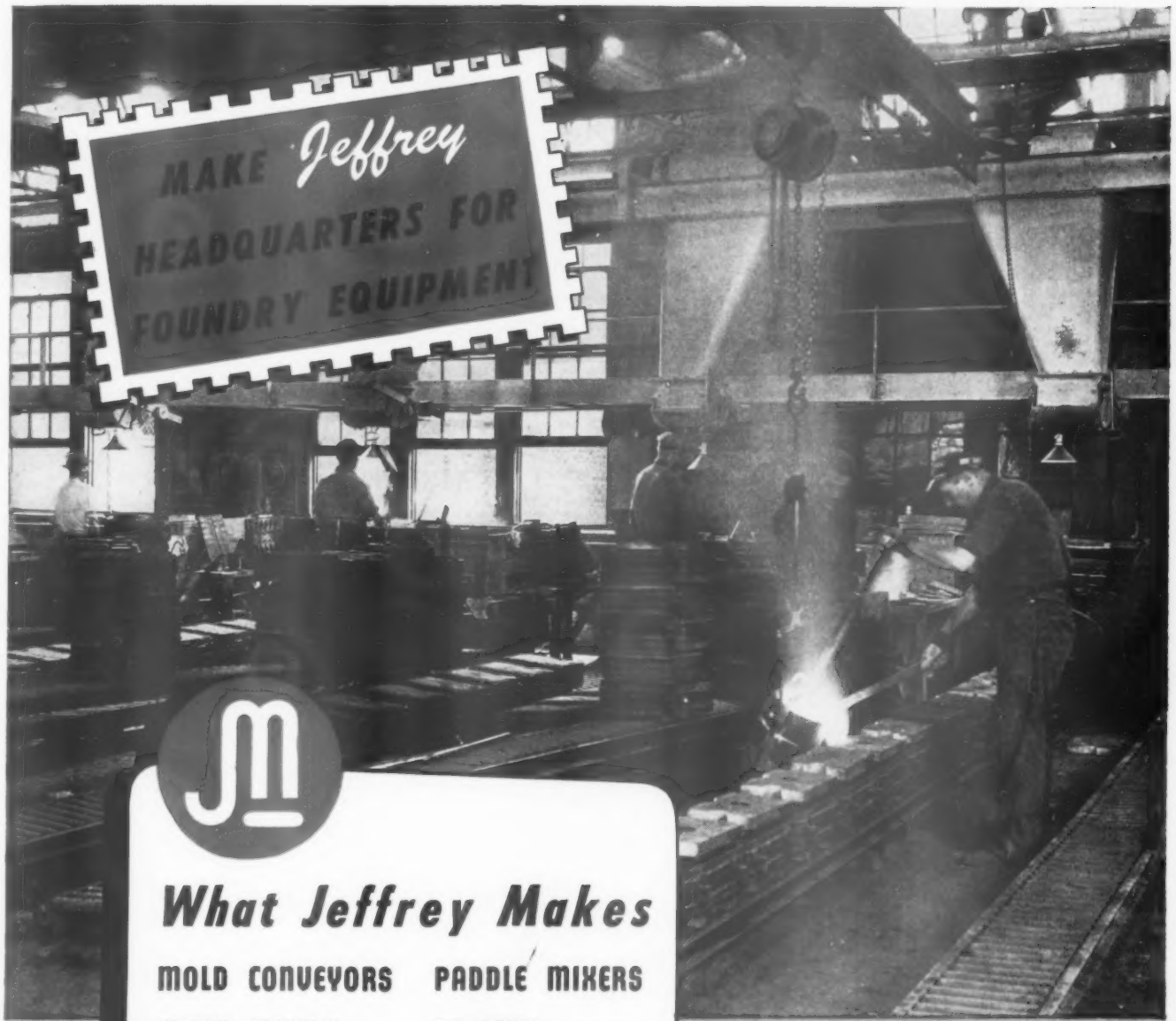


What Jeffrey Makes

MOLD CONVEYORS
PADDLE MIXERS
FLASK FILLERS
SCREENS
AERATORS
BIN VALVES
SANDITIONERS
CONVEYORS
BUCKET ELEVATORS

A Modern Brass Foundry Molding Unit

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

107-99 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

THE ROYER SAND SEPARATOR AND BLENDER

Royerated sand and better castings—they go together to bring more and bigger orders and bigger profits into your foundry. Eliminate the major causes of casting flaws with sand ideally conditioned by a Royer Sand Separator and Blender—more than 7500 Royer installations are backing up production of top-quality castings that assure minimum discount losses and maximum customer satisfaction for foundries everywhere.....

The Royer handles the six major steps in correct sand preparation—it removes trash; reduces sand to uniform, lump-free texture; blends and mixes; distributes moisture evenly; increases permeability 10 to 20 points; and double aerates. The cooled, open, gas-free, velvety finished product helps to eliminate runouts, scabs, drops, skids, rough casting surfaces and surface inclusions .....

Many capacities, portable or stationary—send for Bulletin 744 today.

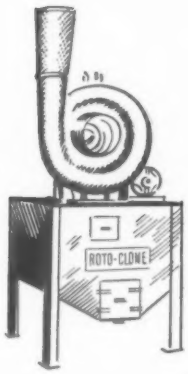
Back of Better Castings

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

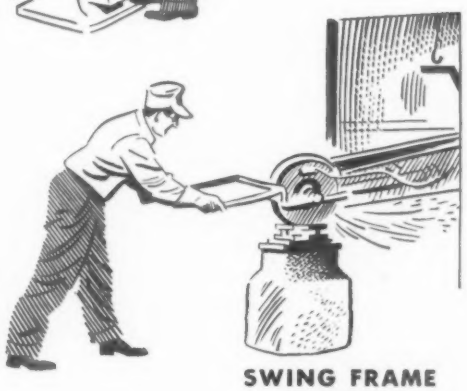
ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA



No matter how you grind it . . .

SNAGGING



SWING FRAME GRINDING

PORTABLE GRINDING

Type D Roto-Clone offers you Efficient, Economical Dust Control

SWING frame grinding, snagging or portable grinding—it makes no difference by what method you make the dust, an AAF Type D Roto-Clone will eliminate this operating hazard effectively.

The Type D Roto-Clone combines exhauster and dust collector in a single compact unit. Highest dust separating efficiency is maintained at all times as it is not affected by changes in air volume or operating speeds. First cost is low because it may be located at or near dust source, eliminating long pipe runs. Installation requires a minimum of space and low power consumption makes for additional economy.

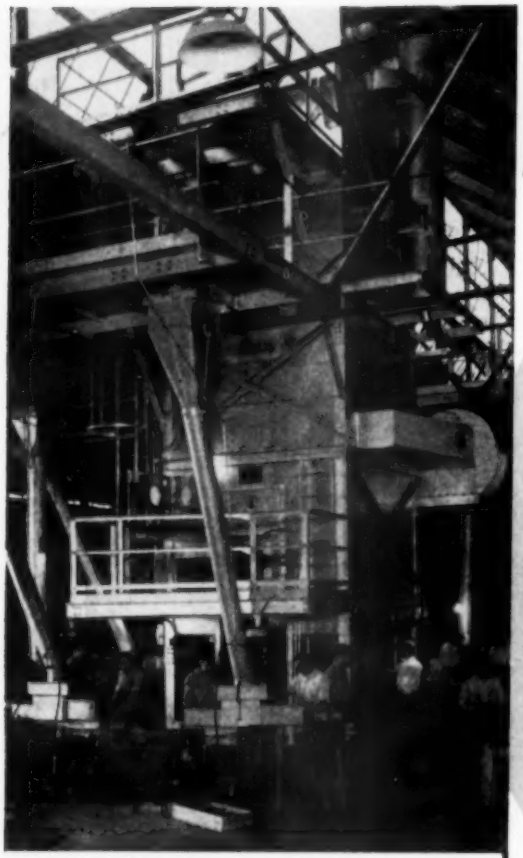
Whether you have a battery of grinders or an individual unit in an isolated location, there's a Type D Roto-Clone of a capacity designed to solve your dust problems—at a saving. Write for Bulletin No. 272.

AMERICAN AIR FILTER COMPANY, INC.
266 Central Avenue • Louisville 8, Ky.
In Canada: Darling Brothers Limited., Montreal, P. Q.

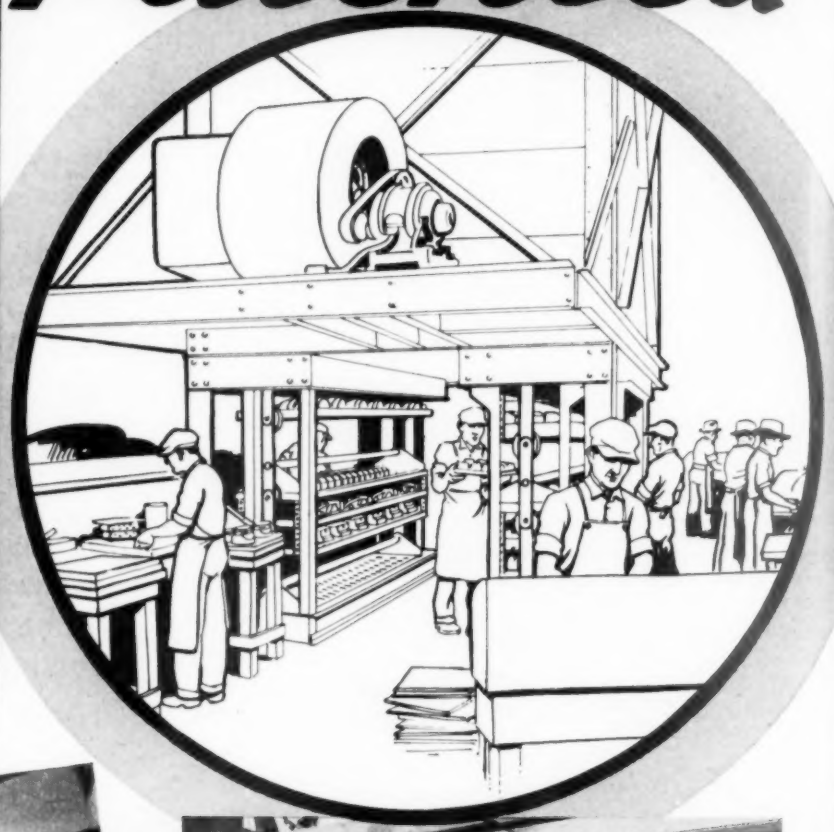
AAF

ROTO-CLONE
DUST CONTROL EQUIPMENT

Patented



MALLEABLE IRON. Note close grouping around this Coleman Tower Oven with Patented Open Loading Center.



MEEHANITE. Coleman Tower Oven in leading foundry producing Meehanite castings. Coremakers placed around three sides of Tower, with unloading of baked cores in foreground.

GRAY IRON. Another example of close grouping of coremakers around Coleman Tower Oven made possible by the Patented Open Center. Jobbing iron foundry.

COLEMAN
CORE *and* MOLD
OVENS

The **FOUNDRY**
CLEVELAND 13

BUILDERS OF COLEMAN

OPEN CENTER

Exclusive Advantage of

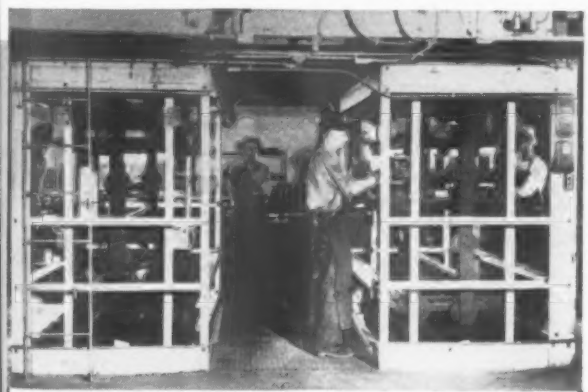
COLEMAN TOWER OVENS

THE PATENTED OPEN CENTER FEATURE makes Coleman Tower Ovens the fastest loading vertical ovens built. It permits loading from both inside and outside the Tower, thereby increasing loading accessibility by as much as 300% over other vertical oven designs. The center loading aisleway enables close grouping of the coremakers around three sides of Tower, saves many steps between bench and oven. Handling labor is reduced to a mere fraction.

COLEMAN TOWER OVENS IMPROVE WORKING CONDITIONS. Cores are cooled and "smoked-off" before they reach the unloading position, permitting immediate handling. No uncomfortable heat, acrid fumes or gases to interfere with worker efficiency.

COLEMAN TOWER OVENS BAKE PERFECTLY, eliminating the cost of rejects and make-over labor.

INVESTIGATE NOW! Ask us to give you full details and refer you to users. The verdict of leading foundries is significant.



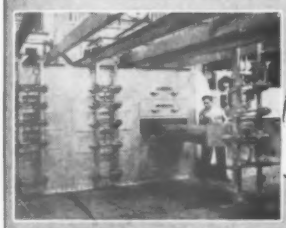
CLOSE-UP of Open Center of large Coleman Tower Oven in aluminum foundry. Note accessibility of both "up" and "down" conveyor lines.

Coleman Ovens are also built in all conventional and special designs to meet every possible requirement in core baking and mold drying. Heating systems can be furnished to use the most economical fuel available in your locality—gas, oil, stoker coal, electricity, etc.

OVER 9,000 SUCCESSFUL INSTALLATIONS

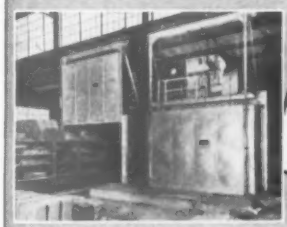
WRITE FOR FOLIO OF BULLETINS

COLEMAN Portable Core Ovens

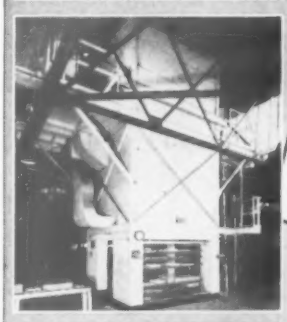


COLEMAN Rolling Drawer Ovens

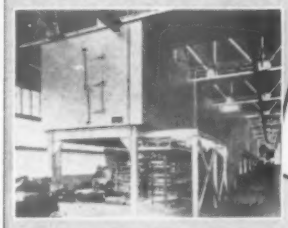
COLEMAN Transrack Ovens



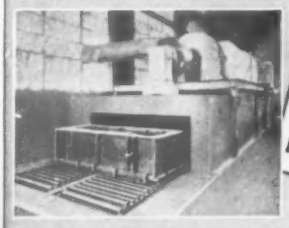
COLEMAN Car Type Ovens



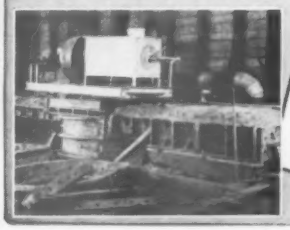
COLEMAN Tower Ovens



COLEMAN Horizontal Conveyor Ovens



COLEMAN Conveyor Mold Ovens



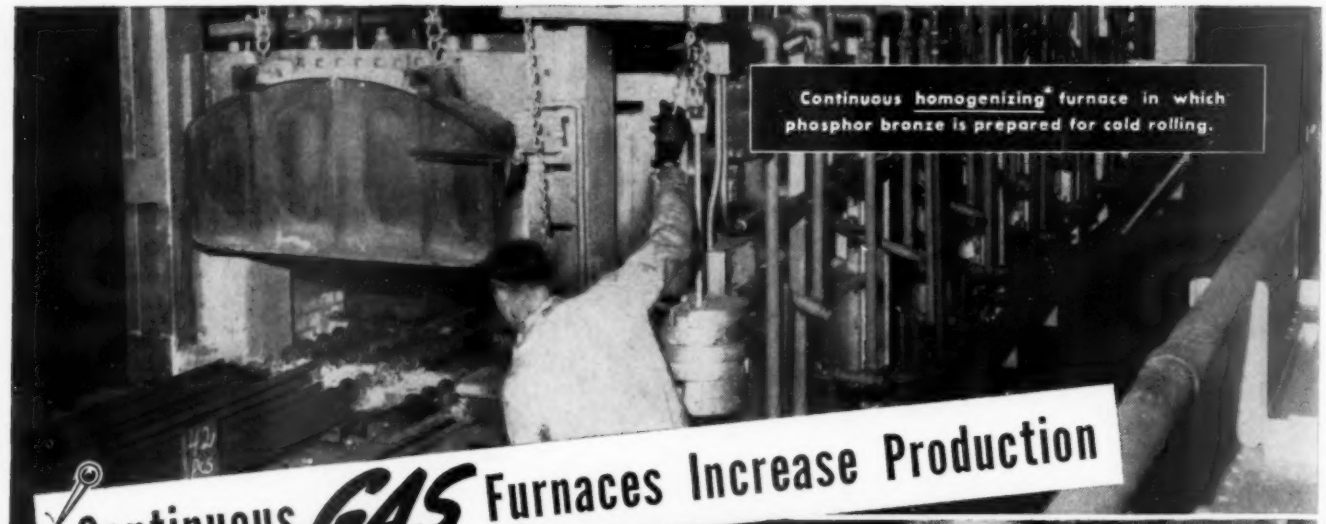
COLEMAN Portable Mold Dryers

RY EQUIPMENT *Company*

D 13 HIO, U. S. A.

AN ND SWARTWOUT OVENS

MEMBER

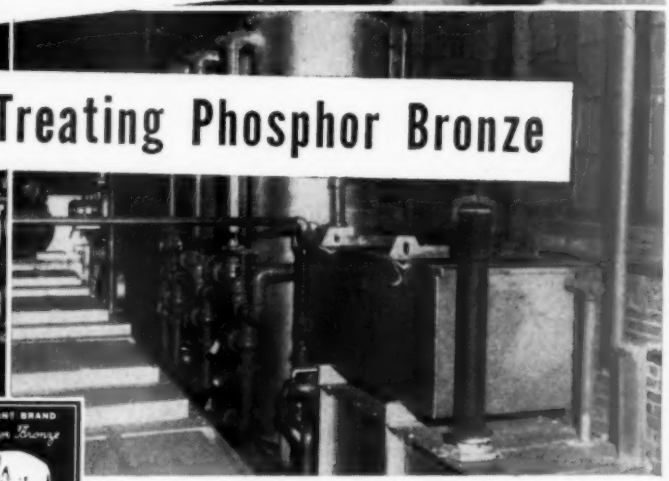


Continuous homogenizing* furnace in which phosphor bronze is prepared for cold rolling.

Continuous GAS Furnaces Increase Production

Reduce Cost of Heat Treating Phosphor Bronze

Roller hearth radiant tube heated furnace using prepared atmosphere for bright annealing.



Atmosphere generating equipment used with bright annealing furnace.

Customers of Phosphor Bronze Smelting Company, 2200 Washington Ave., Philadelphia, started the whole thing—they demanded more Elephant Brand Phosphor Bronze products than the company could produce by former methods of heat treating.

So company production engineers, already familiar with GAS and Gas Equipment, specified the modern method of heat treating—with continuous, automatically-controlled, Gas Furnaces, with integral prepared atmospheres.

Here are the processes . . .

Process—*Homogenizing—a method of heat treating to develop uniform grain structure in phosphor bronze billets prior to rolling, while relieving casting strains.
Temperature—1200° F.
Cycle—6 hours
Furnace Capacity—2000 lbs. per hour

Process—Annealing of bars and sheets in a prepared-atmosphere furnace to retain brightness while relieving stresses set up during rolling or drawing operations.
Temperature—1200° F.
Cycle—40 minutes to 3 hours, varying with stock size
Furnace Capacity—5000 lbs. per hour

Here are the results . . . .

1. Pickling process eliminated
2. Production increased 80%
3. Uniformity of heat treatment assured by automatic control
4. Annealing and homogenizing costs reduced over 50%
5. Working conditions improved

Processes and results like these are worth investigating regardless of the heat treating problem in your production line; your local Gas Company Representative can be of real assistance.

METAL SHOW CHICAGO Oct. 18-24
VISIT A.G.A. COMBINED INDUSTRIAL GAS EXHIBIT

AMERICAN GAS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

MORE AND MORE... THE TREND IS TO GAS FOR ALL INDUSTRIAL HEATING

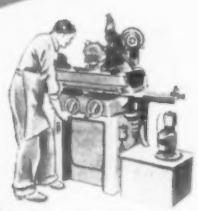
Announcing...

DoALL'S OWN *Separate Machine Tool* SHOW

SEPTEMBER 15 TO 26

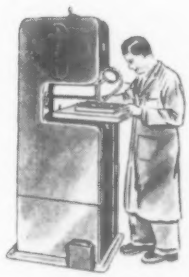
AT DES PLAINES, NEAR CHICAGO

free round-trip transportation from Chicago-Dodge Plant or International Amphitheater

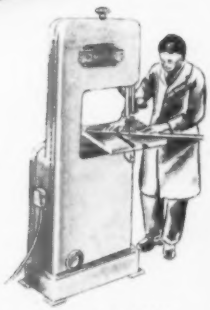


PRECISION SURFACE GRINDING

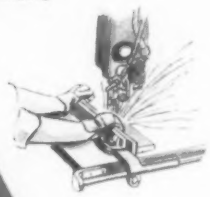
ELECTRONIC INSPECTION



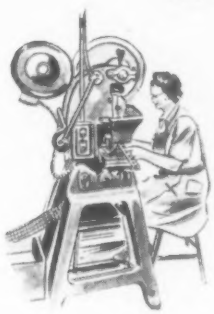
CONTINUOUS BAND FILING



NEW, LOW-COST BAND SAWS

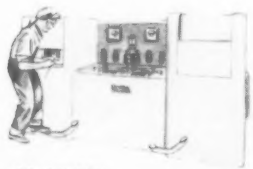


FRICTION SAWING

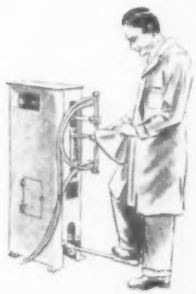


PUNCH PRESSES

CARBIDE-TOOL GRINDING

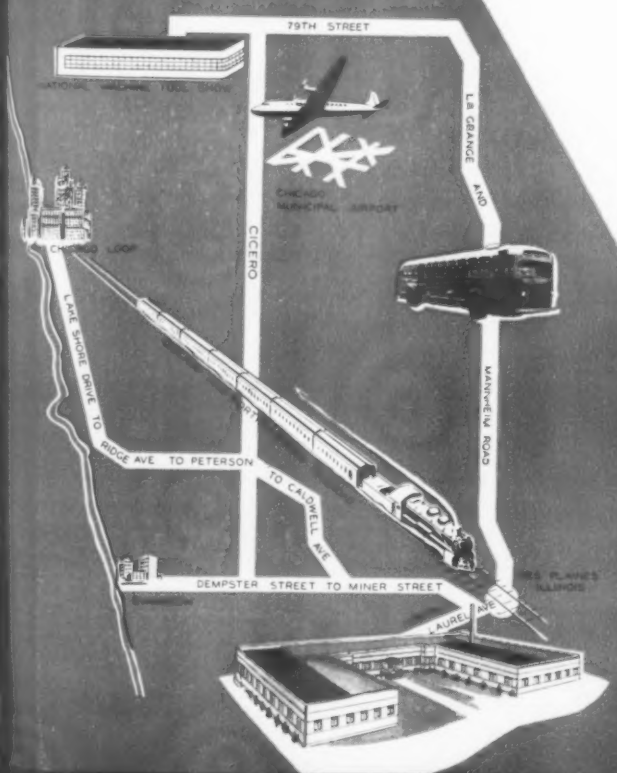


COMBINATION HEAT-TREATING UNIT



SPOT WELDERS

HIGH-PRECISION LATHES



HERE'S YOUR TICKET (More Available on Request)

FREE ROUND TRIP TO DoALL CO., DES PLAINES, ILL.

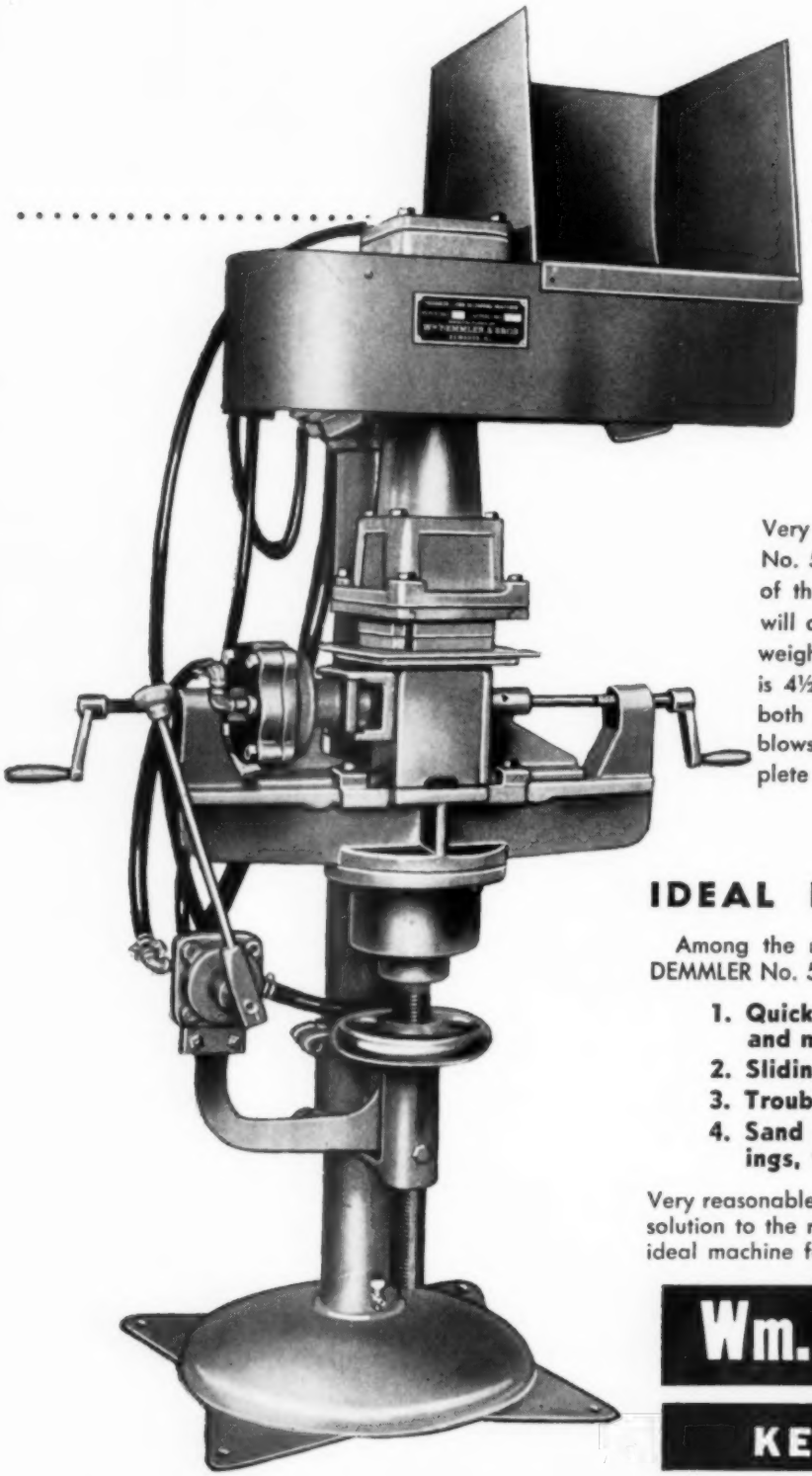
Get bus schedules at DoALL booth 37 Machine Tool Show or booth 100 at International Amphitheatre Show. Upon arrival at DoALL, Des Plaines, Ill., you will be reimbursed for bus or train fare from Chicago.

NAME_____ COMPANY_____

ADDRESS_____ CITY_____ STATE_____

DEMMLER *Announces the new*

NO. 55



A FAST CORE BLOWER EVERY FOUNDRY NEEDS AND CAN AFFORD

Very similar in design to the now famous DEMMLER No. 50, the NEW No. 55 has 2 inches greater depth of throat for longer gang core boxes. The No. 55 will accommodate boxes 9 inches long—handle cores weighing up to 3 pounds. Sand magazine opening is 4½ by 9½ inches. A single hand valve operates both vertical and horizontal core box clamps and blows the core. Only 3 seconds required for complete cycle!

IDEAL FOR SHORT RUN JOBS

Among the many high quality features found on the new DEMMLER No. 55 are:

1. **Quick, easy adjustments for raising the table and moving chuck jaws**
2. **Sliding, quick change blow plates**
3. **Trouble-free diaphragm type blow valve**
4. **Sand magazine and carriage of aluminum castings, with ball bearing rollers**

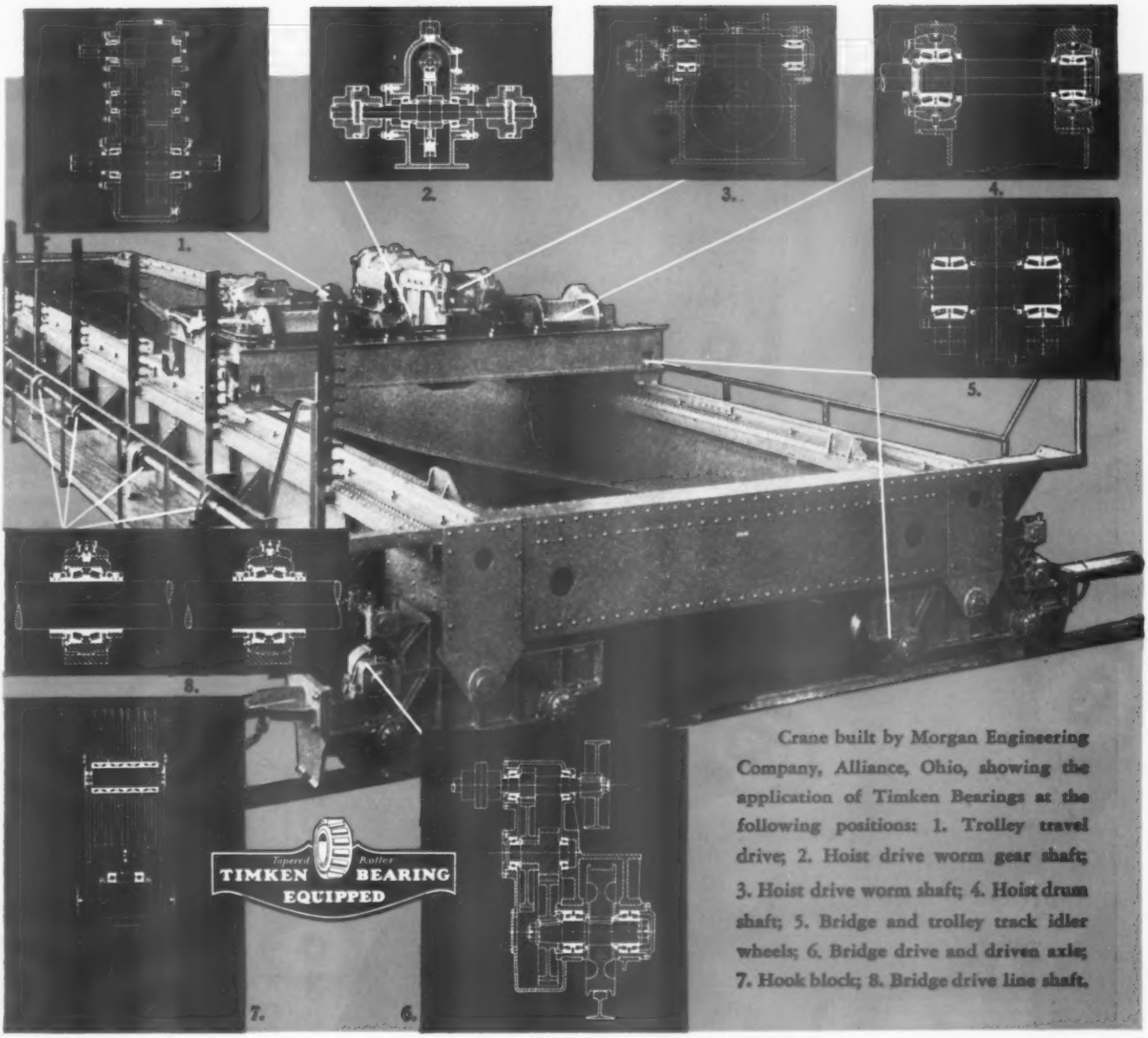
Very reasonable in price, the DEMMLER No. 55 is the economical solution to the rapid production of high quality small cores—an ideal machine for any foundry whether large or small.

Wm. Demmler & Bros.

KEWANEE, ILLINOIS

SEND FOR ILLUSTRATED SPECIFICATION SHEET

Keep 'em Traveling with TIMKEN BEARINGS



Crane built by Morgan Engineering Company, Alliance, Ohio, showing the application of Timken Bearings at the following positions: 1. Trolley travel drive; 2. Hoist drive worm gear shaft; 3. Hoist drive worm shaft; 4. Hoist drum shaft; 5. Bridge and trolley track idler wheels; 6. Bridge drive and driven axle; 7. Hook block; 8. Bridge drive line shaft.

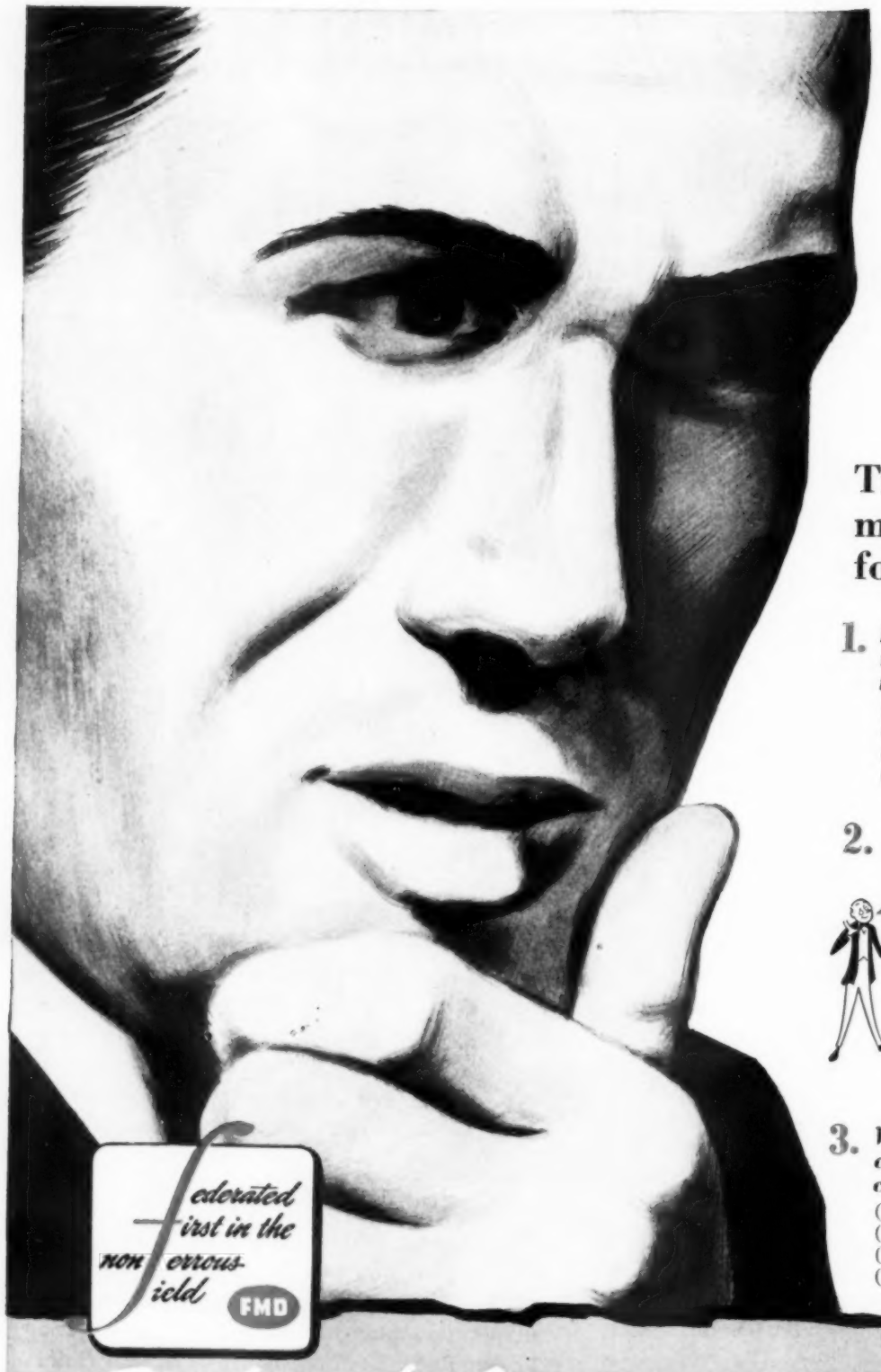
A few Timken Bearings are better than none in any crane; even if you have them only in the bridge and trolley track wheels your cranes will perform better, last longer, cost less for upkeep.

In order to get the *full* benefits of Timken Tapered Roller Bearings however, you must have them *at every bearing position.* Then every moving part will be completely protected against friction; wear; radial, thrust and combined loads and misalignment. Then your cranes will consume less power; require less lubrication; operate faster; stand up longer; need less time out for maintenance.

When buying overhead cranes of any size and capacity for any purpose, it will pay you to specify Timken Tapered Roller Bearings for all positions including those listed above. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◐ AND THRUST —◐— LOADS OR ANY COMBINATION ✳



FOR

non-ferrous experts, that is...

Try your hand at melting down these foundry posers . . .

1. ***In running a heat of aluminum the proper time to stir the metal is:***

(a) When it has just melted
(b) When it is up to temperature
(c) When transferred to the ladle
(d) Just before pouring

2. ***If .0001% by weight of hydrogen separates from molten copper at 1981°F., the volume of gas formed will be equal to what percentage of the copper volume?***

(a) .01% (c) .62%
(b) 44% (d) 13.7%

3. ***What factor is the key to controlling gas porosity in copper-base castings?***

(a) Hydrogen content
(b) Furnace temperature
(c) Oxygen content
(d) Pouring temperature

Federated first in the non ferrous field FMD

Federated METALS DIVISION

AMERICAN SMELTING AND REFINING COMPANY

Attention foundrymen! Have you any posers of your own you would like to see in print? Federated will pay $5 to the contributor of each question accepted for subsequent foundry quizzes. Send in your puzzlers right away.

If you want additional copies of this quiz, or useful literature about non-ferrous casting alloys, use the coupon at right.

N-FMEN Quiz!

4. ***Which of the following aluminum casting alloys has the greatest fluidity and will, therefore, be most satisfactory for detailed castings?***

(a) F480 (4% Cu, 8% Si, no Mg)
(b) F250 (2% Cu, 5% Si, no Mg)
(c) F430 (4% Cu, 3% Si, no Mg)
(d) F410 (4% Cu, 1% Si, no Mg)

5. ***Which of the following gases is most likely to cause gas absorption when melting non-ferrous alloys?***

(a) Water vapor
(b) Carbon monoxide
(c) Carbon dioxide
(d) Molecular hydrogen

6. ***If the only specification for a casting is that it must hold 1000 pounds cold water pressure, which of the following alloys can be used?***

(a) Yellow brass (c) G Metal
(b) 85-5-5-5 (d) 88-10-2

7. ***If a manganese bronze test bar of the 70000 T.S./30% E. variety proves to have a high elongation and a low tensile, what is the usual reason?***

(a) Copper too high
(b) Zinc too high
(c) Poured too cold
(d) Poured too hot.

8. ***What is the most probable source of gas porosity in castings?***

(a) High pouring temperature
(b) Improper gating
(c) Improper melting practice
(d) Wet sand

9. ***When casting copper, the presence in the melt of .02% phosphorus will result in a conductivity of:***

(a) 99% (c) 95%
(b) 98% (d) 90%

10. ***Which of the following alloys shows highest solidification shrinkage, that is, the particular contraction which occurs when metal changes from liquid to solid?***

(a) Aluminum bronze (b) Copper
(c) 80-10-10 (d) Manganese bronze

"DOC TILLITY" says:

HERE ARE THE ANSWERS

1. Avoid stirring altogether; it will create dross that remains in the metal and produces dirty castings. • 2. (b) 44%. • 3. (c) Oxygen content. • 4. (a) F480, because it contains the most silicon, the element which improves fluidity. Notice how the Federated specification number permits easy identification of the alloy's composition. • 5. (a) Water vapor, because it breaks down into atomic hydrogen, which is very soluble. • 6. Any one, providing a properly designed and sound casting is made. • 7. (a) Copper too high. • 8. (c) Improper melting practice. • 9. (d) 90%. • 10. (c) 80-10-10.

HOW TO RATE YOUR SCORE

How'd you make out? If you rang the bell for 8 or more out of 10 you deserve a bigger pay check. With 6 or 7 correct you should be in line for at least a month's vacation in Florida this winter.

Anything less than 6 right puts you in the "somep'n ought be done" class. Try reading some of Federated's helpful literature. And if your non-ferrous problems are really tough, a friendly Federated serviceman will be glad to help you. Call or write any of Federated's 11 plants or 25 sales offices from coast to coast or Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, New York.

FEDERATED METALS DIVISION, Dept. F
American Smelting and Refining Company
120 Broadway, New York 5, New York

Please send me the items I have checked:

- ☐ Non-Ferrous Metals and Alloys booklet
- ☐ Aluminum Casting Alloys booklet
- ☐ Test bars booklet
- ☐ Reprints of technical articles
- ☐ Reprints of this quiz

Your Name .....

Company Name .....

Address .....

City ..... Zone ..... State .....

THE INVISIBLE TOOL...

● Clean Air . . . You can't see it . . . but there's no denying its importance. Increased efficiency, greater production, fewer rejects . . . reduced absenteeism . . . all contribute to more profitable operation of any plant.

A Kirk & Blum System works wonders where a fume condition exists . . . clearing the contaminated, murky atmosphere and brightening not only your plant but your profit picture as well.

KIRK & BLUM Engineers will be glad to show you how a K & B System can improve your production . . . actually pay for itself over a period of time. The Kirk & Blum Mfg. Co., 2808 Spring Grove Ave., Cincinnati 25, Ohio.

Removing fumes from soldering and brazing operations at The Lukenheimer Company, famous valve manufacturers.

KIRK AND BLUM
DUST CONTROL

AN ORGANIZATION OF ENGINEERS & MECHANICS

WRITE FOR ANY OF THESE BOOKS TODAY:
"Dust Collecting Systems for Metal Industries"
"Blower Systems for Woodworking Plants"
"Fan Systems for Various Industries"

For Quicker Production and Better Results, Use Sterling Cylindrical Grinding Wheels

STERLING'S "Wheels of Industry" produce the accuracy and surface smoothness demanded by modern cylindrical grinding methods. Materials that are unusually hard are readily shaped and reduced to size when these superior grinding wheels are on the job.

One of the many reasons for Sterling's better grinding may be found in the bonds that are used. For example, Sterling's H and B Bonds, supplemented by several others, are helping create new production records from cylindrical grinding and crankshaft production. For tungsten carbides, Sterling's famous "23" Bond in Sterbon Wheels has wide application and is being recommended by grinding foremen everywhere.

Take advantage of the better results you will gain from using Sterling Wheels on your difficult jobs. Our engineers will provide every assistance . . . write today!

Sterling

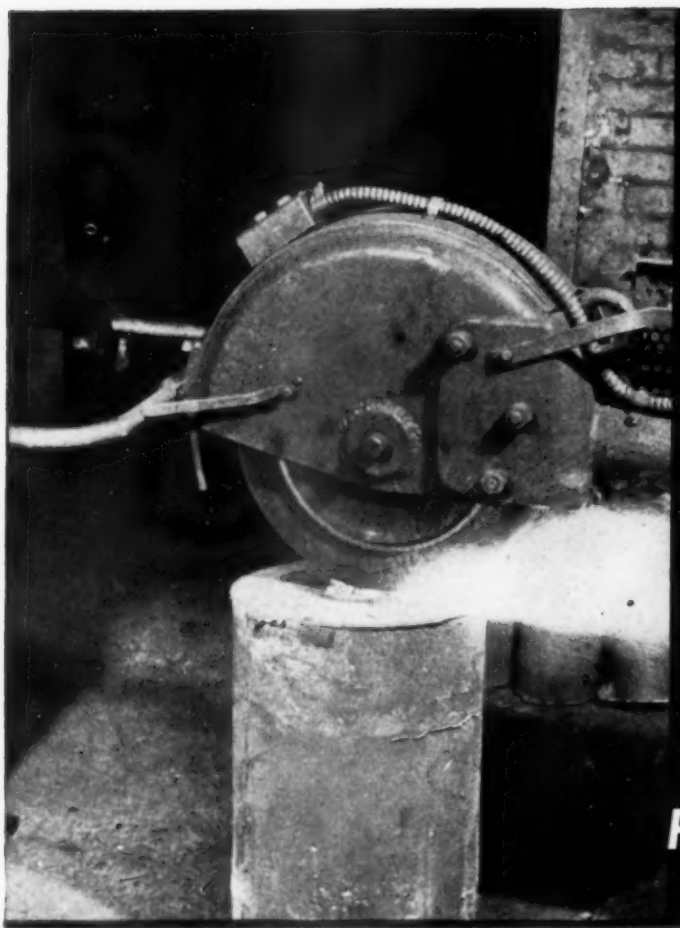
"THE WHEELS OF INDUSTRY"

• This Sterling folder outlines many cylindrical grinding specifications. Sent free.

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY



Electro HIGH SPEED SNAGGING WHEELS

Precision Engineered To The Job

THEY TAKE IT AWAY *Faster!*

Step up your wheels speed 50%. Yes, to 9500 SFPM! Hang these super-snaggers in your portable, swing-frame or floor-stand machines. Sock the loads to them. Watch excess metal disappear with incredible speed. See these wheels defy resistance, withstand shocks and prove their safety. Check their temperatures. See how cool they run despite their terrific cutting power. Switch to them now. Get set to do a thorough job. Save time for the men on the next operation. Win good will and extra profits all along the line with Electro HIGH SPEED SNAGGING WHEELS.

YOU NEED THIS MANUAL

Every executive who deals with grinding needs this Manual. It covers the whole subject of abrasives, binders, wheel types and the precision engineering of them to a given job. Many full-color action photos. Ask us for a free copy. Use business stationery, please.

K-240

Electro TRADE MARK SINCE 1919

Electro REFRACTORIES & ALLOYS CORPORATION

MFRS. · REFRACTORIES · CRUCIBLES · STOPPERS · ALLOYS · GRINDING WHEELS

344 DELAWARE AVENUE — West Coast Warehouse Los Angeles — BUFFALO 2, NEW YORK

It's sooner than you think...
...when you may step out of an aluminum house...
...to commute on an aluminum bus...
...to work in an aluminum office building...
...then home to relax on aluminum furniture...
...or work in the yard with aluminum tools!
More and better aluminum products—today...with
Kaiser Aluminum
a Permanente Metals product

What things do you think of when we say "aluminum"?

When asked that question in a recent survey, 92% of the people interviewed replied: "Pots and pans."

On the other hand, *less than* 4% mentioned such aluminum "naturals" as roofing and siding, heating and ventilating equipment, gutters and down-spouts, busses, garage doors, garden tools, home-trailers.

What does this mean?

Simply that while aluminum has proved itself the successor of other metals in hundreds of applications . . . public awareness has largely remained at the pot-and-pan level.

And without awareness, how can there be *demand?*

To increase consumer awareness of aluminum products . . . to interpret them in terms of *better living* and thus create demand . . . is the objective of the above advertisement and the many that will follow.

They will appear, in full color, in such top-read magazines as Saturday Evening Post, Newsweek, Collier's, Time, Sunset, reaching a total audience of over 30 million every month! Such advertising, we believe, is bound to influence the buying habits of a big share of this audience.

Which will mean a lot more business for the makers of aluminum products.

Ready to serve you—*today*...

Kaiser Aluminum

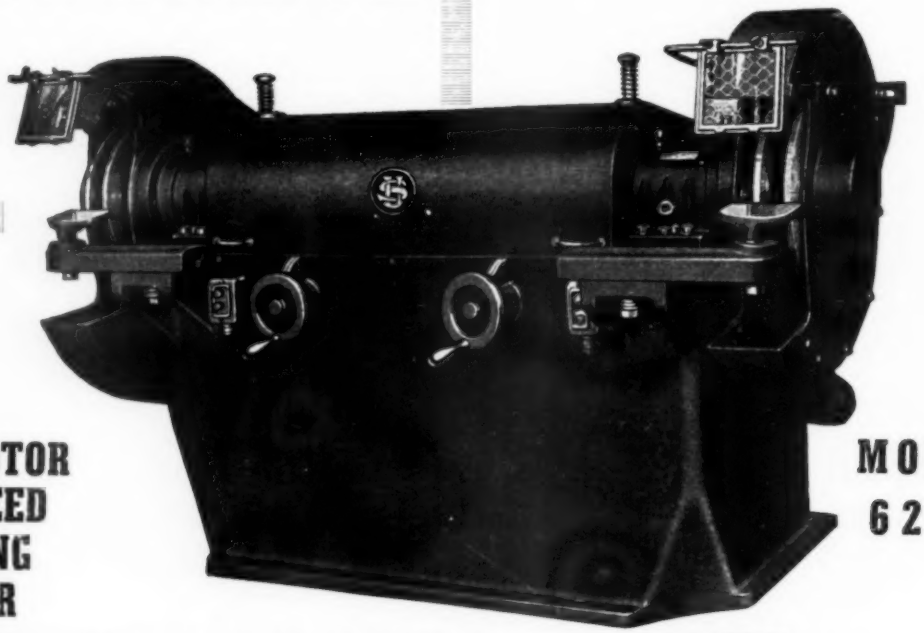
a Permanente Metals product

DISTRIBUTED BY PERMANENTE PRODUCTS COMPANY, KAISER BLDG., OAKLAND, CALIFORNIA . . . WITH OFFICES IN:
Seattle, Wash. Oakland, Calif. Los Angeles, Calif. Dallas, Texas Wichita, Kan. Kansas City, Mo. St. Louis, Mo. Atlanta, Ga. Minneapolis, Minn. Milwaukee, Wis. Chicago, Ill. Cincinnati, Ohio Cleveland, Ohio Detroit, Mich. Boston, Mass. Hartford, Conn. Buffalo, N. Y. New York City, N. Y. Philadelphia, Penn. Washington, D. C.

UNITED STATES ELECTRICAL TOOLS BUILT FOR MEN WHO DEMAND BEST PERFORMANCE

★Designed first, last and foremost for useful, practical, dependable performance in production and maintenance. Engineered so they are well-balanced, perfectly proportioned to reduce fatigue and increase efficiency. Built of basic materials for long-lasting, economical service. In brief, these are

THE BEST ELECTRICAL TOOLS MADE!



★DUAL MOTOR VARI-SPEED SNAGGING GRINDER

MODEL 62-VS

FOR VITRIFIED OR HIGH SPEED WHEELS

Constant peripheral speed for each wheel, results in increased production and longer wheel life. Maximum peripheral speed can be maintained for the life of the wheels. Adjustable wheel guard and speed changer are interlocked to prevent overspeeding of grinding wheels. Totally enclosed fan-cooled ball-bearing motors. Magnetic starters. Push-button stations on front of pedestal. Heavy chrome-manganese spindles operate in heavy duty ball-bearings. Wheel guards of boiler plate ADJUSTABLE TO WHEEL WEAR. Safety eye shield and numerous other features.

THE UNITED STATES ELECTRICAL TOOL CO. OUR 50th YEAR CINCINNATI, OHIO

CONTACT YOUR DISTRIBUTOR FOR PRICES AND DETAILS

Drills, grinders, surfacers, polishers, sanders, tappers, saws, hole saws, valve seat grinders, valve refinishing shops, flexible shaft machines and other electrical tools.

The UNITED STATES ELECTRICAL TOOL Co.
CINCINNATI, OHIO

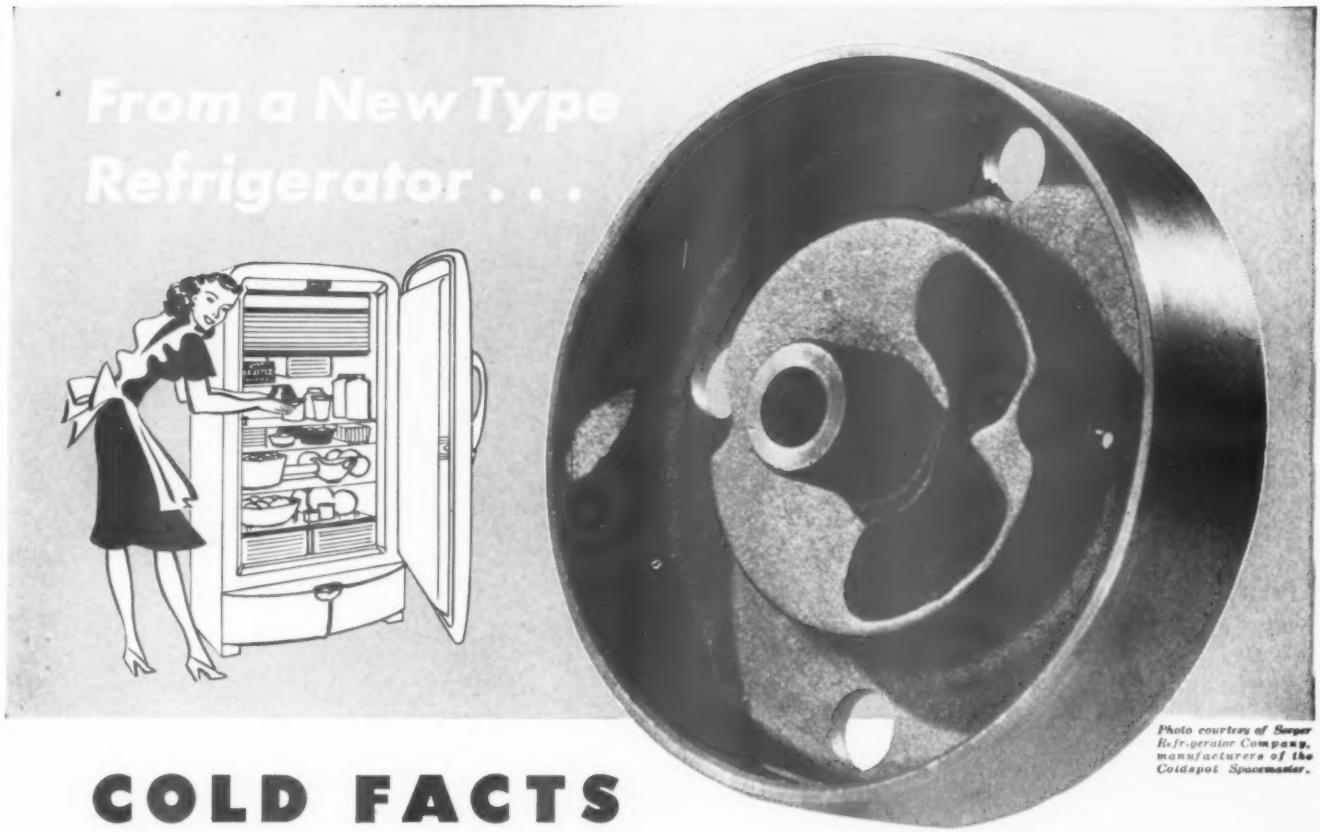


Photo courtesy of Sarger Refrigerator Company, manufacturers of the Coldspot Spacemaster.

COLD FACTS about the *Top Machinability* of CHATEAUGAY PIG IRON

Turning . . . drilling . . . internal and external grinding . . . tapping and threading . . . chamfering . . . milling . . . these are the machining operations performed on this compressor-head casting used in a revolutionary new-type refrigerator which utilizes every interior inch for food storage.

Why is it made of CHATEAUGAY? Here are the facts—taken from actual foundry production records: When made with ordinary pig iron, 52% of the castings were too hard for economical machining on a mass production basis . . . heat treating proved uneconomical because many became too soft and ultimately were scrapped.

With CHATEAUGAY, the picture has changed completely. Of more than 77,000 castings produced, only 1.5% were above hardness limits . . . and of these, all eventually passed rigid inspection.

This is but one of countless jobs in which the use of CHATEAUGAY Pig Iron has solved costly, troublesome foundry problems. A Republic Pig Iron Metallurgist will be glad to give you further facts and figures at your convenience. Just let us know when you would like him to call.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

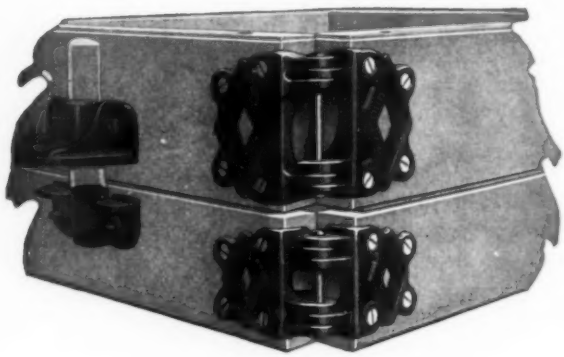
REPUBLIC STEEL

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

ALL OUT FOR DIAMOND FLASKS

Another foundry modernizes to speed production and reduce costs with Diamond Flask Molding Equipment.

Diamond flasks are noted for their superior fittings. For instance, the latch fitting is self-compensating for wear. The tighter you draw it, the firmer the grip. Special cam is easily adjusted as extreme wear develops. Hinge construction includes careful milling of parts and interlocking feature which eliminates "play." In every way, you will find Diamond flasks precision-made for high production.



Our Flask Line is complete, of course, including all *special shapes* and a related line of *steel jackets.*

Originators of SNAP FLASKS

DIAMOND

Telephone 2553 **CLAMP AND FLASK COMPANY** Richmond, Indiana

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

A Blast cleaned Tractor casting having passed final inspection after cleaning in a Pangborn Air Blast Room—is now ready for shipment.

AIRBLAST* ROOM CLEANING

FILLS AN IMPORTANT FOUNDRY NEED

For certain types of cleaning and finishing of heavy metal parts, the modern Pangborn Blast Cleaning Room produces a high volume of work—uniformly cleaned—for each unit of labor, power, and abrasive expended.

For complete data —

*For airless ROTOBLAST equipment see pages 6 and 7.

COME TO

Pangborn

CORPORATION

HAGERSTOWN • • • • • MARYLAND

It's another highly mechanized foundry...

"THE PERFECT FLASK EQUIPMENT FOR USE WITH SAND SLINGERS"

THE HINES

3431 WEST 140th ST.

and they're equipped 100% with

HINES *"Pop-Off"* FLASKS

TRADEMARK
Fully Protected by U. S. and Foreign Patents

S F L A S K C O.

CLEVELAND 11, OHIO

NONE BETTER

MELTRITE

PIG IRON

Exactly What the Name Implies

More USED than Any Other Merchant PIG IRON—

Such Preference Must Be Merited

PICKANDS MATHER & COMPANY

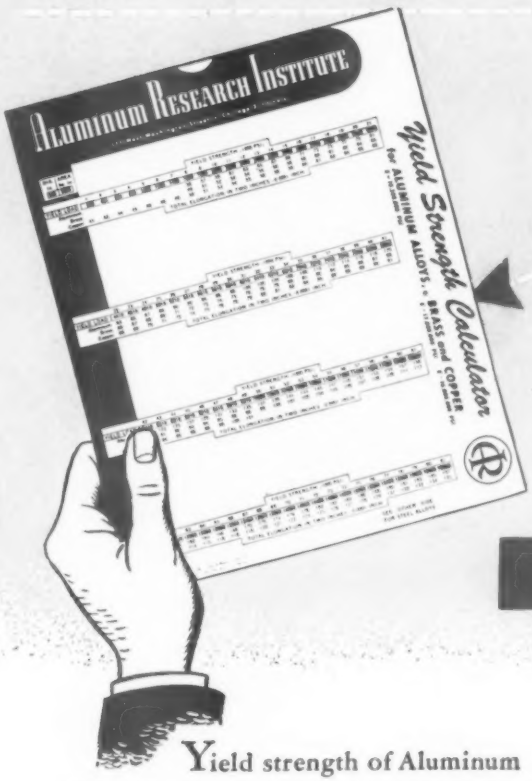
CLEVELAND • CHICAGO • DETROIT • ST. LOUIS
ERIE • DULUTH • MINNEAPOLIS • TOLEDO

P M

IRON ORE • PIG IRON • COAL • COKE

New Accurate RAPID METHOD

For YIELD STRENGTH Determination



- For Aluminum Alloys, Brass, Copper, Steel (carbon and low alloy)
- By Calculator — Without Stress-Strain Curves
- Results obtained in 3 minutes
- Method described in *ASTM Bulletin*, March, 1947

AN A.R.I. PROJECT FOR INDUSTRY

Yield strength of Aluminum Alloys, Brass, Copper and Steel (carbon and low alloy) can now be determined in a fraction of the time usually required.

The ARI YIELD STRENGTH CALCULATOR is new, convenient, accurate, economical, and as easy to use as a slide-rule. One skilled operator can run as many as 20 complete tests per hour.

Developed at the Case School of Applied Science as part of a continuing research program for Aluminum Research Institute, and described in a paper by Ebert, Fried, and Toole in the *ASTM Bulletin* for March, 1947, the ARI YIELD STRENGTH CALCULATOR is offered at approximate cost of production.

Printed in color on heavy varnished stock, size 8″ x 10″, it is mailed in convenient filing envelope.

ARI Yield Strength Calculators are available from Aluminum Research Institute at $1.00 each, postpaid

MEMBER ALUMINUM RESEARCH INSTITUTE

ALUMINUM RESEARCH INSTITUTE

111 West Washington Street • Chicago 2, Illinois

Samuel Greenfield Co., Inc.
Buffalo 12, New York

William F. Jobbins, Inc.
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R. Lavin & Sons, Inc.
Chicago 23, Illinois

The National Smelting Co.
Cleveland 5, Ohio

Niagara Falls Smelting & Refining Corp.
Buffalo 17, New York

North American Smelting Co.
Philadelphia 34, Pennsylvania

Sonken-Galamba Corp.
Kansas City 18, Kansas

U. S. Reduction Co.
East Chicago, Indiana

Aluminum and Magnesium, Inc.
Sandusky, Ohio

The American Metal Co., Ltd.
New York City 6

Apex Smelting Co.
Chicago 12, Illinois

Berg Metals Corp.
Los Angeles 11, Calif.

The Cleveland Electro Metals Co.
Cleveland 13, Ohio

Federated Metals Division A. S. & R. Co.
New York City 5 and Branches

General Smelting Company
Philadelphia 34, Pennsylvania

Tests prove that
HYDRO-BLAST CLEANS AIR IN A FOUNDRY

THAT the air in a foundry gets cleaned by operation of Hydro-Blast has never been seriously questioned. As a general proposition it is acknowledged that the dust concentration within 50 feet of a Hydro-Blast unit drops 50 per cent within half an hour after Hydro-Blast operation is begun.

To give foundrymen facts instead of generalities, Hydro-Blast Corporation reports the results of a series of dust count tests, made in representative foundries for Hydro-Blast by Warren F. Terry, consulting engineer and nationally known authority on air analyses and dust counts.

Mr. Terry's findings are to be presented in a series of summarized reports. Foundry names will not be mentioned; the complete reports are in the files of Hydro-Blast Corporation. The first report is shown on the opposite page.

Alert foundrymen, it is believed, will see from these reports what a valuable contribution Hydro-Blast can make to more attractive working conditions as well as to important operating economies.

If you are determined to minimize dust, we suggest a consultation with Hydro-Blast engineers as a constructive step in the right direction.

Report of Dust Count Tests in a steel foundry producing large castings

Foundry in full operation.

Hydro-Blast room 24′ long, 22½′ wide and 16½′ high; solid roof; located in the side foundry bay.

Fifteen windows approximately 5′x5′ tilted about half open, scattered along in the monitor the entire length of the building on the side over the Hydro-Blast.

About 25 feet from the Hydro-Blast room, four chippers removing sand cores from large castings.

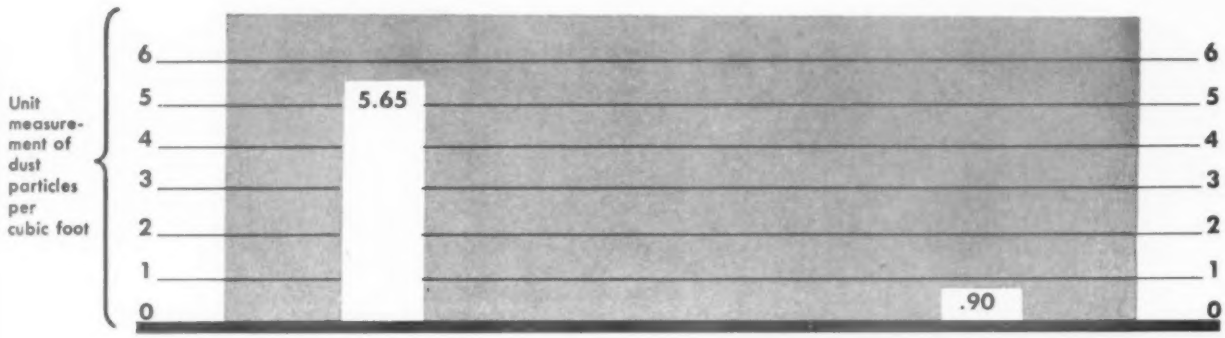
About 20 feet away, a swing-frame grinder operator at work on a large casting about 10 feet in diameter.

About 40 feet away, a sand blast in operation, with considerable dust escaping beneath the door.

1 **Tests made outside Hydro-Blast room at breathing level . . . at a point about 10 feet away, to determine the general concentration of foundry air**

SAMPLE 1
Before Blasting
. . . Hydro-Blast doors open.
Duration—20 minutes.

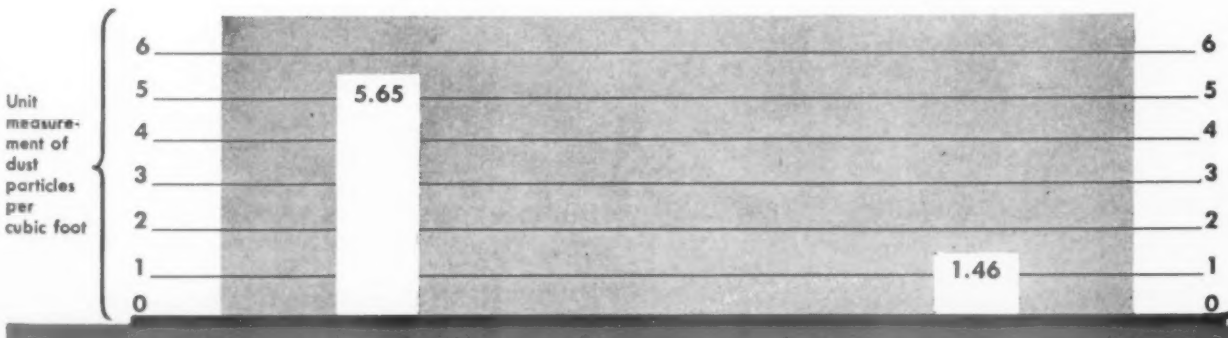
SAMPLE 2
Immediately After Blasting
. . . doors closed.
Duration—30 minutes.



2 **Tests made inside Hydro-Blast room at breathing level**

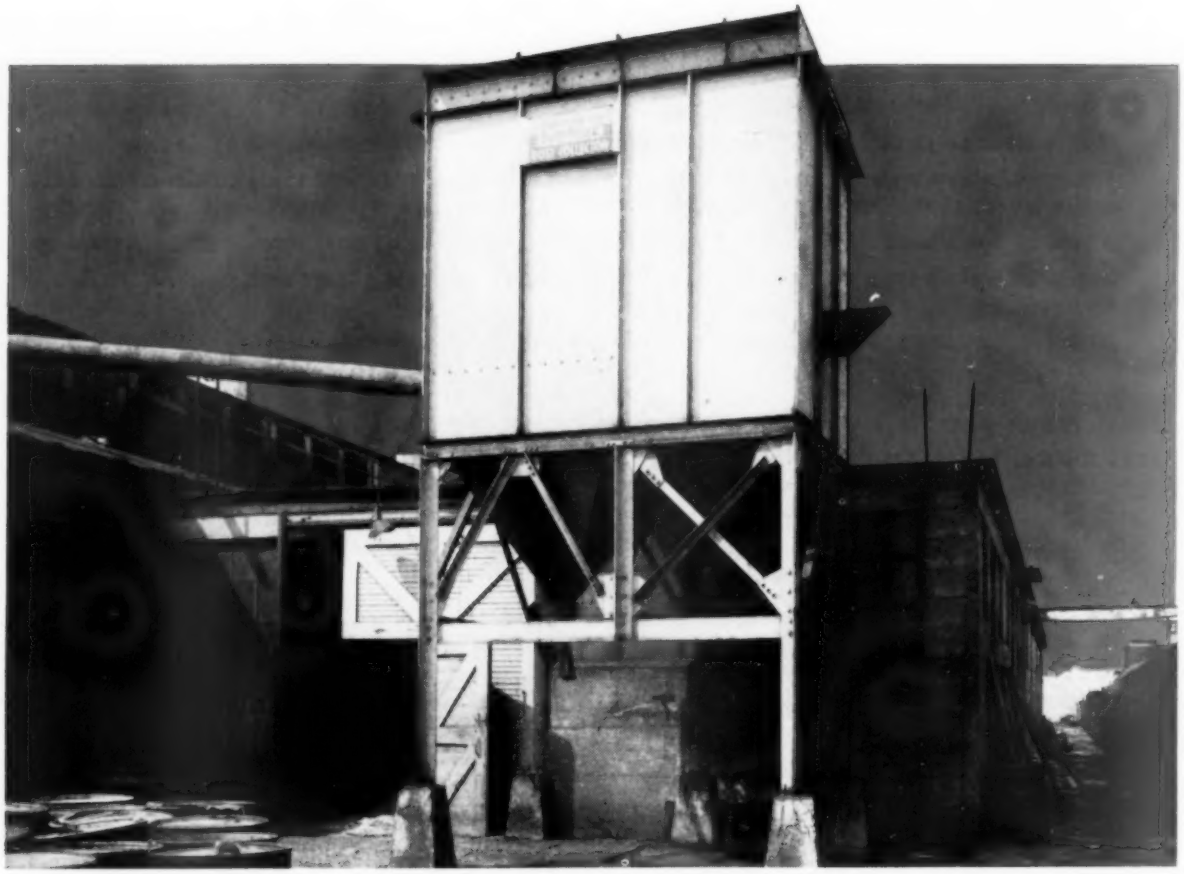
SAMPLE 3
Before Blasting
. . doors open; simultaneous with Sample 1.
Duration—20 minutes.

SAMPLE 4
Immediately After Blasting
. . . doors closed; simultaneous with Sample 2 to determine settling rate of fine particles held in suspension.



HYDRO-BLAST
2550 N. WESTERN AVENUE • CHICAGO 47, ILLINOIS

when comparing the merits of dust collectors



CHECK THE FIELD PERFORMANCE

Actual performance figures, compiled by the men who own and operate the machines, make the best basis for comparing Dust Collectors . . . a check on field performance will bring to light amazing differences in efficiency and operating costs.

It is for this reason that we invite you to make a comparison between the "Dustube" and any other collector you may choose to investigate. We will be glad to furnish you with a list of Dustube users in your vicinity so that you can make your own comparisons.

Check over the following statements of Dustube users and see what they think about its performance.

"The American Dustube is the most trouble-free Dust Collector I have ever seen. We never do anything but dump it." *Superior Steel & Mall. Cstgs. Co., Benton Harbor, Michigan.*

"The American 'Dustube' Dust Collector that we installed for collecting Zinc Oxide, we believe to be the ultimate in perfection. It is surprisingly small for the work it does. It stops every grain of Oxide in the tubes and is 100% efficient."

W. J. Bullock, Birmingham, Alabama

"We've used ours for 2 years. They've given so little trouble that I'd forgotten all about them. Not a cent of maintenance."

Industrial Steel Treating Co., Oakland, California.

"We recently had a check-up in our foundry by the State Health Division as to dust conditions, and in this department we were given a clean bill of health. In fact, we were complimented on the excellent condition of this department. This, of course, is all due to the excellent work by the 'Dustube' equipment."

Simplex, Inc. Beaver Dam, Wisconsin

Write today for more complete information about the many advantages of DUSTUBE dust collectors. Ask for catalog 72.

Representatives in principal cities

American
WHEELABRATOR & EQUIPMENT CORP.
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dustube
DUST COLLECTORS

Keep that Membership in Your Trade Association

DURING the past eight years, membership and interest in the various trade associations serving producers of castings and manufacturers of foundry equipment and supplies have increased considerably. Problems of war production and materials procurement brought forth greater recognition of the need for a medium which permits discussion and detailed consideration of the various problems common to all manufacturers in a specialized field. Through joint effort in a trade association manufacturers were able to accomplish much more than could have been done by individual action.

In the foundry and related industries, trade associations appear equally valuable in highly competitive fields, or for practically noncompetitive producers who are marketing their products in a single industry. These associations may provide a wide variety of services to members, including such features as market surveys, cost promotion, wage reports, credit reports, production and sales volume statistics, products promotion, educational programs, consultation service, production improvement, research, and many others.

The opportunity of discussing these common problems with the other producers in the field constitutes one of the most important values provided by the trade association.

But the acquaintances and friendships developed through association meetings and committee work probably provide the greatest return for the time and money invested in trade association activities. Most men who have been active in such organizations over a period of years will put this particular benefit at the top of the list.

The war years and the reconversion period proved conclusively that trade associations are mandatory in times of national emergency. It is doubtful if the foundry industry could have been expanded to meet critical needs, and if the tremendous tonnages of castings could have moved from the foundries of the nation if trade associations had not been concentrating on problems of government contracts, priorities, material procurement, manpower, and equipment. Some associations were strong when the emergency developed and were able to perform outstanding service to the nation and the industry immediately. Others gained strength as time went by and their effectiveness increased in direct proportion.

To have a strong association ready and able to serve in times of intense activity or national emergency, it is necessary to keep that association alert and strong at all times regardless of the general condition of business or the immediate need of particular services. This was proven by the war experience. An association cannot maintain a strong position or be ready to provide the necessary emergency service to an industry if the individual members withdraw support when business declines.

The foundry industry probably will have great need for its various trade associations during the next few years. Let's not be guilty of waiting until the fire breaks out before we appropriate the funds to provide for the fire department.

Frank G. Steinbach

Editor

Convection In Gray

IN PHYSICS textbooks, convection currents are defined as the transfer of heat by moving masses of matter, as by currents in gases and liquids by differences in temperature and, therefore, in density. Although it is logical to expect convection currents in all liquids there has been little positive proof of their existence, magnitude, or importance in liquid metals.

Gray noticed the influence of convection currents from observations of segregation, shrinkage, and temperature when he studied the side feeding of steel castings.[1] He declared that convection currents occurred most markedly when bottom gating was practiced. The hottest steel was present at the bottom of the mold when pouring was completed but rose to the top as soon as turbulence ceased. Short heads and short castings were influenced very little by these currents, and the influence also was not great in top-poured castings. Gray concluded that in castings with a thickness less than 3 in. there was no time for convection currents to occur before preliminary growth of the columnar wall was finished. However, gray did not take into consideration pouring temperatures, which undoubtedly have a great influence on convection currents.

Steel foundrymen have developed a number of fundamental practices, such as directional solidification and bottom risering. When attempts were made to apply these steel foundry practices to cast iron, the results were unsuccessful. Evidently, cast iron and steel do not have the same solidification characteristics and physical properties at high temperatures.

Many of the solidification characteristics of cast iron have been theorized from observations of completely solidified castings. Such examinations were usually made by sectioning with saw cuts. However, such a technique has been inadequate for development of a fundamental understanding of the mechanism or dynamics of solidification. In previous work at the Naval Research Laboratory, Fifield and Schaum observed the solidification characteristics of gray iron by bleeding cylinders at selected time intervals after pouring and by measuring internal metal temperatures with thermocouples. (Bleeding is the process in which a casting is poured, allowed to set a short interval of time, and then drained of all remaining liquid metal). They concluded that gray iron solidifies by forming interlacing dendrites which extend from the surface to the center of the casting and entrap large quantities of metal having lower freezing temperatures during the early stages of solidification.

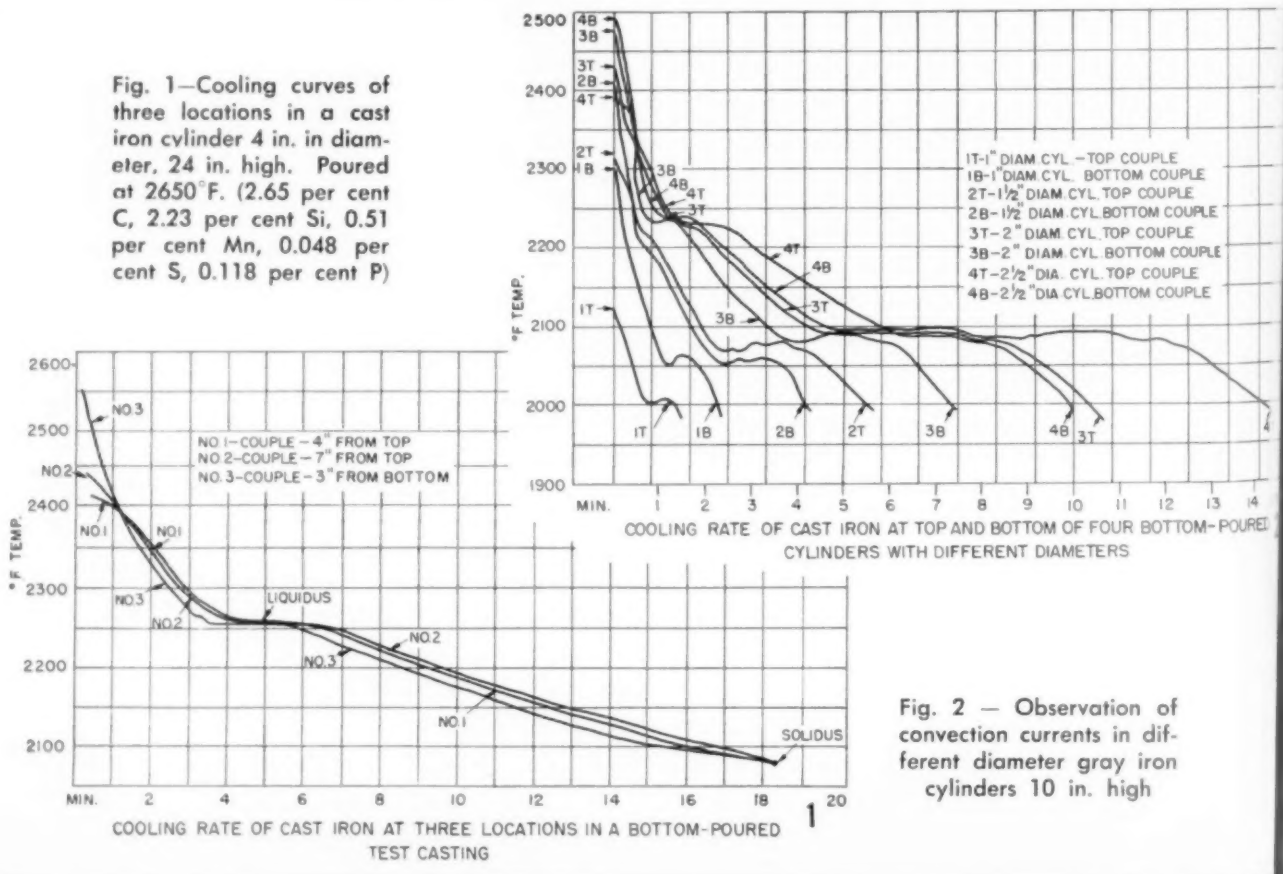


Fig. 1—Cooling curves of three locations in a cast iron cylinder 4 in. in diameter, 24 in. high. Poured at 2650°F. (2.65 per cent C, 2.23 per cent Si, 0.51 per cent Mn, 0.048 per cent S, 0.118 per cent P)

Fig. 2 — Observation of convection currents in different diameter gray iron cylinders 10 in. high

CURRENTS in Cast Iron

By J. H. SCHAUM
Naval Research Laboratory
Washington

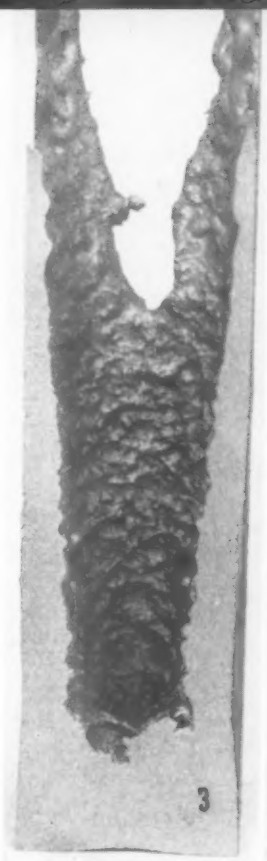


Fig. 3—Taper of wall thickness shown in a casting top bled 2 minutes after pouring

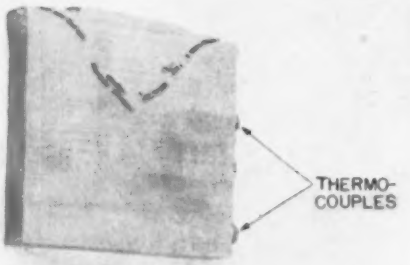


Fig. 4—Center slice of test casting which has been rotated 180° before reaching the liquidus

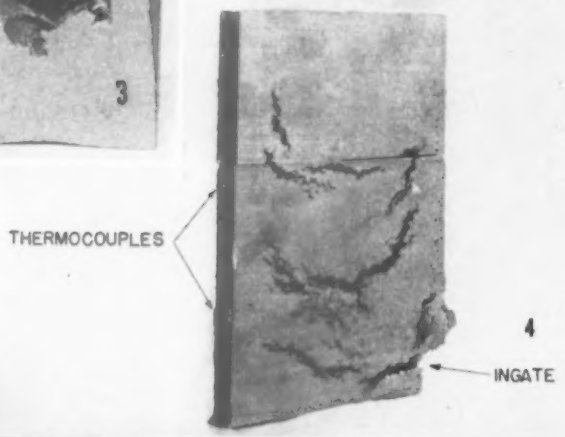


Fig. 5—Equipment used for investigating convection currents

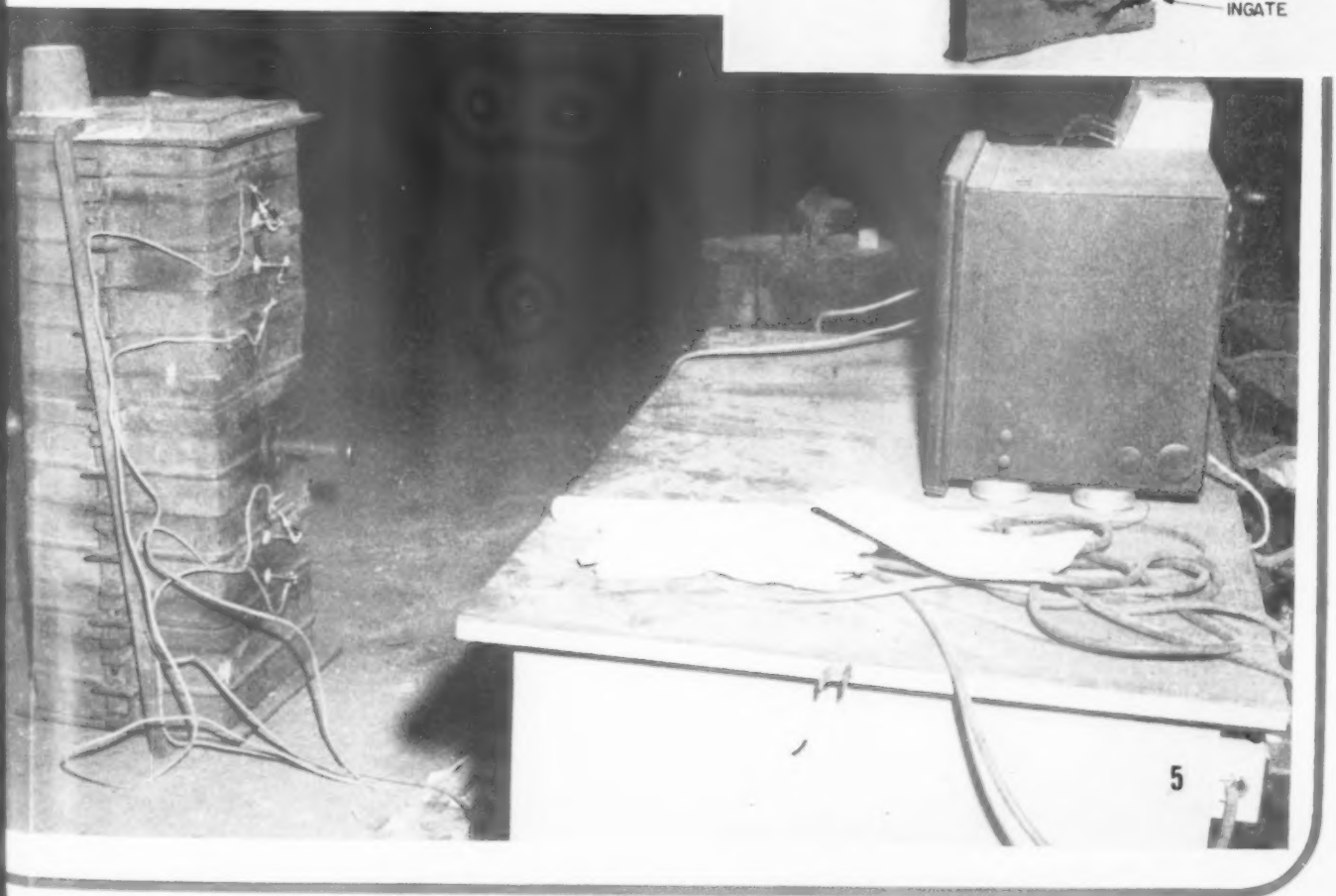
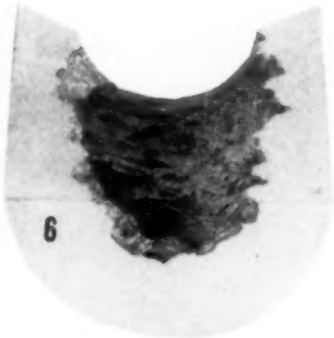


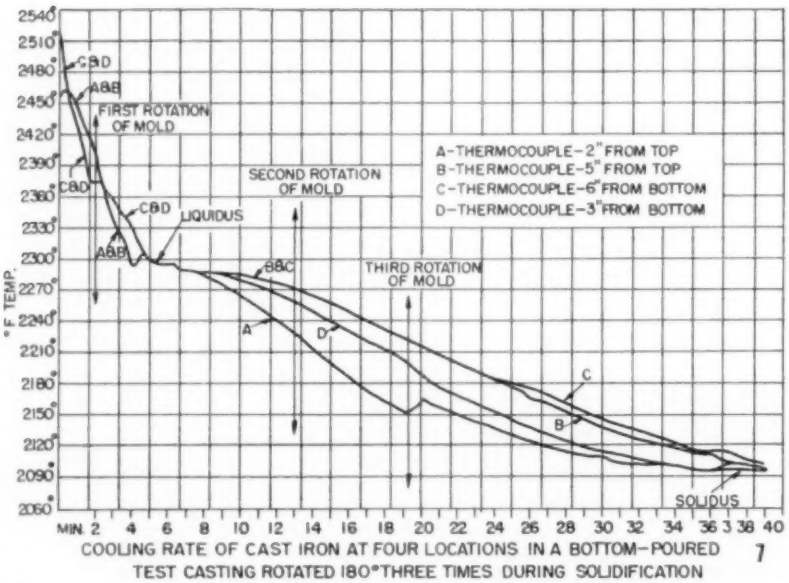
Fig. 6—Taper of wall thickness shown in a bottom-poured, bottom-bled test casting

Figs. 7 and 8—Observation of convection currents in cast iron cylinder 6 in. diameter, 32 in. high; bottom gated, rotated 180° three times after pouring



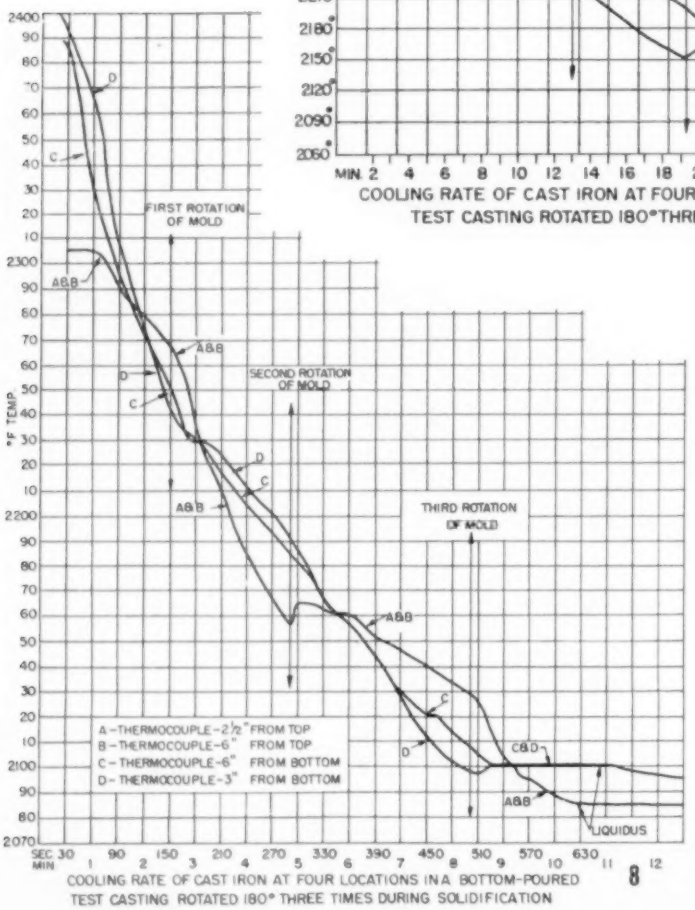
In gray cast iron the contraction in volume caused by the solidification of the entrapped metal is generally compensated by the expansion which occurs as a result of the formation of graphite. The length of the time interval between pouring and bleeding a casting naturally influences the extent to which the process of solidification or skin formation has proceeded. The rate of solidification is dependent on many variables such as degree of superheat above the liquidus at the time of pouring, chemical composition, mold material, inoculation, etc.

Gray iron for the experimental castings described in this report was melted in a clay-graphite crucible contained in a high-frequency lift-coil type induction furnace. The charge was composed of charcoal pig iron, scrap, Armco iron, Mexican graphite, and ferroalloys. All the iron was superheated to 2850°F, inoculated with 0.50 per cent silicon as 50 per cent ferrosilicon, and poured 5 to 10 minutes later. Molds were rammed with synthetic sand and were allowed to air dry at least one

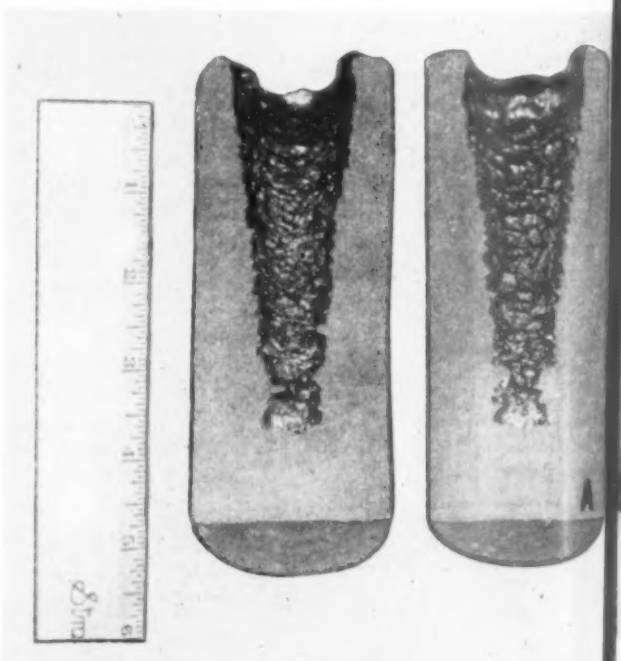


COOLING RATE OF CAST IRON AT FOUR LOCATIONS IN A BOTTOM-POURED TEST CASTING ROTATED 180° THREE TIMES DURING SOLIDIFICATION

Fig. 9 — Taper of wall thickness shown in four test castings. *A* — Top poured and bled. *B*—Top poured and bottom bled. *C*—Bottom poured and top bled. *D*—Bottom poured and bottom bled



COOLING RATE OF CAST IRON AT FOUR LOCATIONS IN A BOTTOM-POURED TEST CASTING ROTATED 180° THREE TIMES DURING SOLIDIFICATION



day. Ladle temperatures were read with an immersion type thermocouple. Cooling data within the casting was obtained by inserting platinum, platinum-rhodium thermocouples in quartz tubes which extended into the mold cavity. An automatic high-speed temperature recorder provided a continuous record of temperature changes within the casting. Macro-examination of the solidification characteristics was afforded by bleeding partially solidified castings.

In the first bleeding experiments, simple blocks, 2 in. thick, 6 in. long and 8 in. high were top poured, permitted to set from 2 to 5 minutes, and then inverted to allow the remaining liquid metal to run out of the solid shell which had formed. Fig. 3 shows one of these blocks which was sectioned transversely through the center of the larger face. This iron contained 2.82 per cent C, 2.10 per cent Si, 0.61 per cent Mn, 0.056 per cent S, 0.173 per cent P, and was poured at 2534°F, a temperature which is 300°F above the liquidus, and was bled 2 minutes after pouring.

The pronounced taper of the walls from 3/4-in. at the bottom to 3/8-in. near the top is typical of all such blocks. It was felt that this taper could only be partially attributed to end effect of the bottom surface. However, the chilling effect at the open top, which was radiating heat rapidly to the atmosphere, should have overcome the initial advantage of top pouring which placed the hottest metal in the top of the casting. The fact that the top metal remained the hottest for 2 minutes, as evidenced by the walls of the bled casting, in spite of the radiant heat loss at the top, led to the conjecture that convection currents may have a strong influence on the solidification characteristics of cast iron. More definite evidence of this phenomenon is presented later in this article.

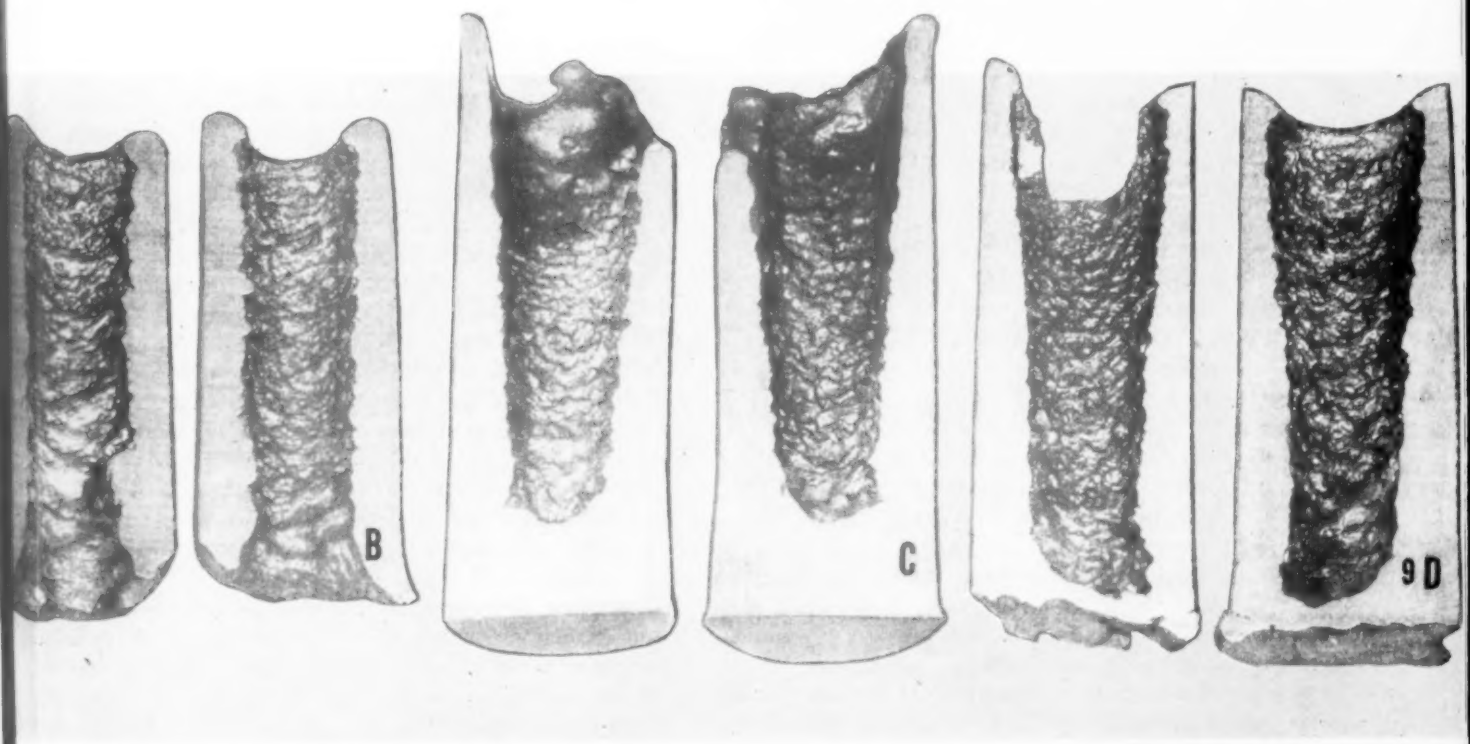
The next series of bleeding experiments was made on cylinders 2½ in. in diameter and 8 in. high. Since cylinders have greater strength to resist compressive forces, observations were not obscured by collapsing walls, as may be the case with rectangular blocks.

These cylinders were top and bottom poured and top and bottom bled so that pouring and bleeding variables could be correlated with solidification characteristics. Bottom bleeding was made possible by pouring a 2½-in. diameter cylinder attached to and centered over a plate 3½-in. in diameter and 1½-in. deep. The cylinder was torn from the plate by lifting the cope from the drag so that the remaining liquid iron could drain through the bottom.

Fig. 6 is a photograph of one of these cylinders, bottom poured at 2612°F and bottom bled 3 minutes and 19 seconds later. A high-speed temperature recorder with a platinum, platinum-rhodium thermocouple in a quartz protection tube was used to measure the temperature in the center of a duplicate cylinder. This iron had a liquidus at 2295°F and was bled near the end of the liquidus isothermal hold. The metal contained 3.00 per cent C, 1.72 per cent Si, 0.63 per cent Mn, 0.026 per cent S, and 0.007 per cent P. The same pronounced taper is apparent in this casting. The wall measured 1-in. in thickness at the bottom and 3/8-in. at the top.

The influence of end effects, pouring method, and bleeding technique are shown in Fig. 9. Proceeding from left to right, casting *A* was top poured and top bled, *B* was top poured and bottom bled, *C* was bottom poured and top bled, and *D* was bottom poured and bottom bled.

All four castings show the same tendency of the wall to taper from thick at the bottom to thin at the top in spite of the different methods of pouring and bleeding. The walls of the top-poured cylinders naturally showed a more marked taper since the hottest metal was mechanically placed at the top. The effect of convection currents on the solidification of iron is (*Please turn to page* 192)



HOW TO PREVENT

INVESTIGATION of snagging wheel breakage in a large number of foundries shows that in many it constitutes an appreciable element of snagging cost. In others it is negligible.

Where wheel breakage is common, there is practically always an inexcusable ignorance of the many conditions which make wheels break, plus failure to make competent men responsible for seeing that wheels are properly handled, mounted, operated and inspected, and that machines are maintained in good condition.

Most foundries take adequate precautions to protect men and equipment from injury by covering wheels with hoods. That is both humane and money-saving, but it does nothing to reduce the often high cost of the wheels themselves. The thing to do is to *prevent* wheel breakage.

Whatever the apparent immediate cause of a wheel breaking, the basic cause is always the same—subjecting the wheel to a stress it is not designed to stand. It may break into pieces outright, as from being dropped or thrown or from centrifugal force set up by excessive speed. Again, unwarranted stresses may weaken the wheel to such an extent that it will break at the normal speed which it was built to withstand.

It is not the purpose of this article to describe the devices which protect men and equipment from being harmed by the fragments of a broken wheel, but to show how breakage can be, if not eliminated, at least greatly reduced, with consequent dollars-and-cents savings in wheel cost and lost production.

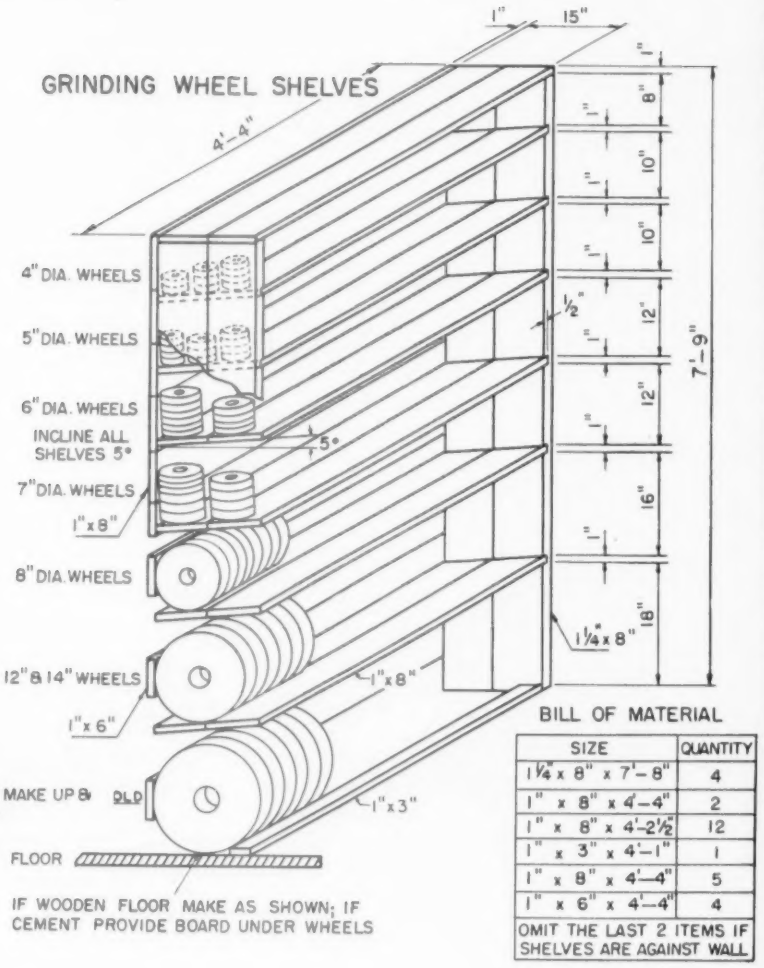
The fundamental causes for wheel breakage in the snagging room are: (1.) Rough handling; (2.) Poor machine condition; (3.) Improper grinding practice; (4.) Improper mounting.

Handling—As soon as a wheel has been unpacked, it should be inspected, to spot possible damage in transit. Even though no damage is evident to the eye, the wheel should be suspended and tapped gently with a piece of wood such as the handle of a screw driver. Very large wheels may be sounded with a wood mallet. The sound will indicate if the wheel has been cracked. A vitrified wheel should give a clear metallic ring if sound. Resinoid wheels give a somewhat different sound. A very little practice will enable the inspector to spot a cracked wheel of any kind of bond. If the wheel is wet or has sawdust adhering to it, the sound will be somewhat deadened.

Straight snagging wheels should be stored on edge in racks such as shown in the accompanying illustration. These give the wheel two-point cradle support to prevent rolling, and have enough partitions to prevent the wheels from tipping over. The storage space should be dry and

By R. B. FAIR
Abrasive Engineer
Simonds Abrasive Co.
Philadelphia

Snagging Wheel Breakage



BILL OF MATERIAL

SIZE	QUANTITY
1¼" x 8" x 7'-8"	4
1" x 8" x 4'-4"	2
1" x 8" x 4'-2½"	12
1" x 3" x 4'-1"	1
1" x 8" x 4'-4"	5
1" x 6" x 4'-4"	4
OMIT THE LAST 2 ITEMS IF SHELVES ARE AGAINST WALL	

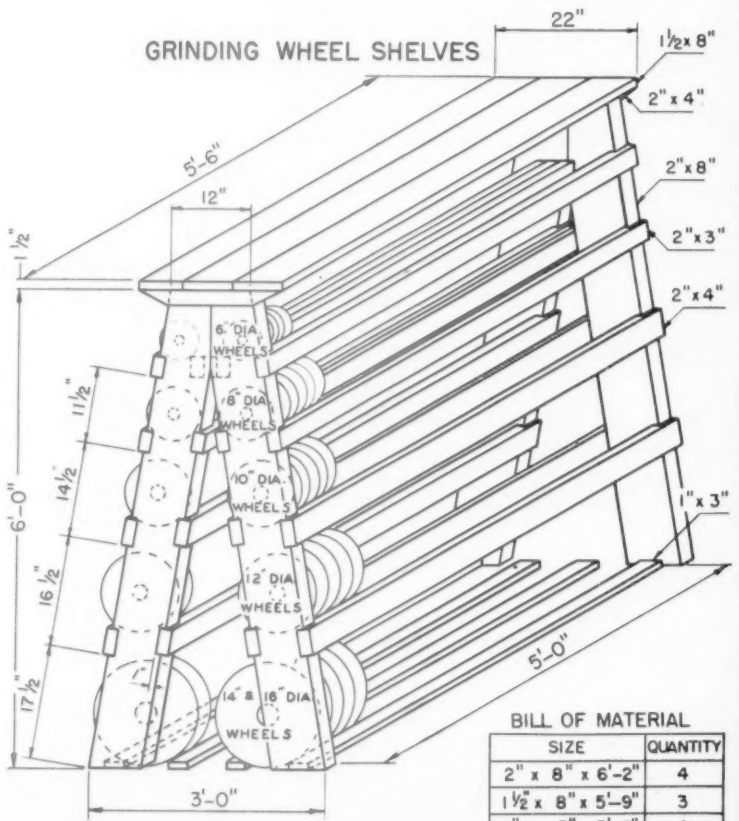
not subject to extreme changes of temperature.

All wheels should be protected against dropping and bumping. It is bad practice to roll a large wheel, because of danger of the wheel toppling over on its side, the shock of which is often enough to break it. In the few instances when rolling seems necessary, be sure that the floor is smooth, clean and free of obstructions and protect the wheel with a strip of cork or rubber.

In placing wheels on trucks, stack them carefully and do not allow castings or tools to be placed on top of them.

A great many shop men realize that vitrified wheels are comparatively fragile, and so handle them carefully. But because resinoid and rubber wheels stand up under heavy stock removal at high speeds, they are often credited with far greater strength than they possess, and needlessly subjected to abuse. It is not uncommon to find stockrooms in which the attendants make it a practice to save time by tossing these wheels on to shelves and trucks, under the wrong impression that they are practically unbreakable.

However, in one case enough broke as a result of comparatively small drops that tests were made on quite a



Snagging wheels should be stored on edge in racks which give the wheel two-point cradle support to prevent rolling, and with enough partitions to prevent tipping over. Two racks of this type are illustrated here

BILL OF MATERIAL

SIZE	QUANTITY
2" x 8" x 6'-2"	4
1½" x 8" x 5'-9"	3
1" x 3" x 5'-0"	4
2" x 4" x 5'-4"	8
2" x 3" x 5'-4"	9
2" x 4" x 1'-10"	2

large number of various make wheels commonly used for high-speed snagging. All wheels had stood up under speed tests at 14,250 surface feet per minute or more.

These wheels were dropped flat on a concrete floor from a height of 12 inches. All suffered cracks which caused the wheel to break at low speed. Some of the cracks were easily visible to the naked eye. Most of them could be seen with a magnifying glass. In a few cases the cracks could not be seen even with a glass, and one wheel did not sound cracked when tapped with a mallet.

All of the wheels tested were very strong ones which will normally stand high speeds and considerable unnecessary abuse. They probably could have stood such a drop had they landed on edge, but the flat landing—such as is apt to result when a wheel is tossed on a truck —was too much for them to stand. Since the damage was not always evident, it is wise to inspect any wheel, no matter how strong, for the second time before it is mounted, to guard against subsequent breakage.

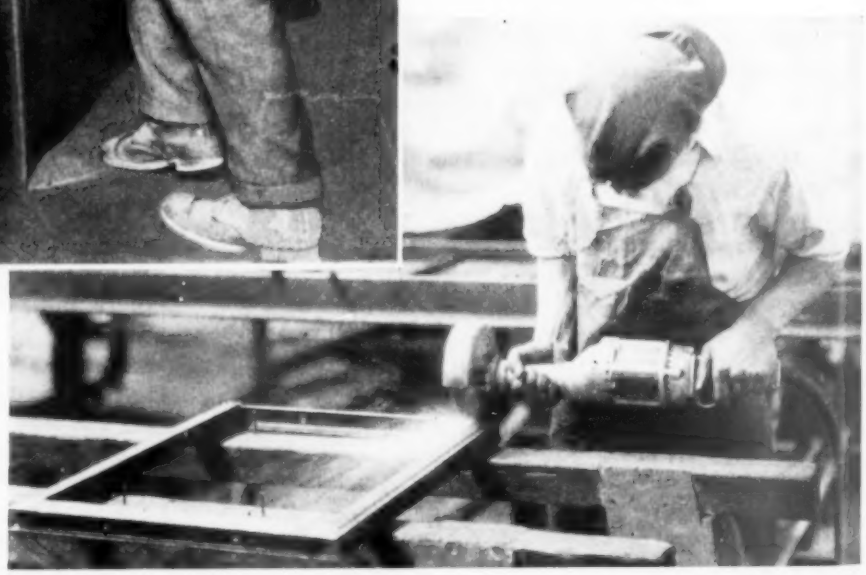
Modern high speed snagging machines can generally be relied upon to be well designed and made. They are heavy enough to prevent undue vibration, the spindles are large enough to carry safely the large wheels commonly used, and the bearings stand up well under the high speed and pressures used.

To maintain them in good condition is important. Loose bearings or a mounting which is out of balance is nearly sure to result in vibration which will cause the wheel to pound on the work excessively which at the least will cause rapid wheel wear, and at the worst may cause the wheel to break.

Wheels are often broken on bench and floor stand grinders by a dressing tool or small work-piece being drawn between the work rest table and the wheel. The Safety Code ("The Use, Care and Protection of Abrasive Wheels" approved by American Standards Association and sponsored by the Grinding Wheel Manufacturers Association and the International Association of Industrial Accident Boards and Commissions) says that the rest shall never be farther than 1/8-in. from the periphery of the wheel, and shall be securely clamped in position after each adjustment. Wheel wear is the usual cause of there being too great distance between wheel and rest. The maintenance man should make it his business to inspect this feature at frequent intervals.

When wheels are mounted by means of a central spindle nut, it is necessary for the thread to be such that as the wheel revolves the nut will tend to tighten against the flange.

Accidents from this condition are most common on double-end bench and floor stand grinders, which are of course provided with a spindle which has a right-hand thread on one end and a left hand thread on the other. It has happened that when reassembling such a machine after repairing it, the spindle has been turned end-for-end, which is apt to result in both wheels being thrown off, since the tendency is for both nuts to be unscrewed by the rotation of the spindle. (*Please turn to Page* 180)



Two common foundry applications of snagging wheels are the stand grinder (above) and portable hand grinder (right)

By ROBERT H. HERRMANN
Assistant Editor
THE FOUNDRY

Portable Yard Crane

Handles Materials Economically

FOR A NUMBER of years the Fremont Foundry Co., Fremont, O., has been using a portable yard crane for handling pig iron, scrap, sand, coal and for miscellaneous heavy lifting and cartage jobs in the foundry yard.

At the time of its purchase the machine replaced two men who had been doing all the work of unloading cars, moving and piling scrap and pig iron, hauling refuse, stacking and moving flasks, and unloading and moving heavy machinery. That was 8 years ago. The volume of work to be done now has increased greatly, and both Myron J. Miller, Fremont Foundry president, and O. J. Fleck, superintendent, agree that they don't know how they could get along without the crane.

The crane is of the tractor type with steel crawlers. The cab and 40-ft boom will turn 360 degrees on the chassis, making the effective working range of the machine a circular area about 80 ft in diameter. Although a load may be lifted to the tip of the boom—a distance of about 45 ft from the ground (*Please turn to page* 188)

Right—Portable yard crane shown lifting scrap with detachable magnet. *Below*—View of crane with clamshell bucket attached unloading sand from car into storage bin through hatch in roof

By E. F. TIBBETTS
Metallurgist
The Lummus Co.
New York

Gas and Shrinkage IN TIN BRONZES

MOST foundrymen are familar with gas and shrinkage problems. Literally hundreds of papers have been written on gas in bronze and quite a large number on overcoming shrinkage defects. Recent work in this country and in England has been particularly valuable in determining basic fundamentals so that proper practices can be set up for producing sound castings. In spite of knowledge handed down through the years and supplemented by more recent scientific research, not all foundrymen realize the similarity in appearance of gas and shrinkage when present in small amounts, nor do they in many cases appreciate the serious effect of such slight unsoundness on physical properties and pressure tightness.

It is well understood that gas porosity is essentially a melting problem, but it must be completely understood and controlled before any effective method of control of shrinkage porosity can be developed. Gas, by being evolved in the solidifying metal, effectively counters atmospheric pressure, with the result that such castings will contain shrinkage voids which are filled with the offending gas. The voids have no resemblance whatever to pinhole porosity, but are interdendritic cavities typical of tin bronze or any other alloy with a wide solidification range.

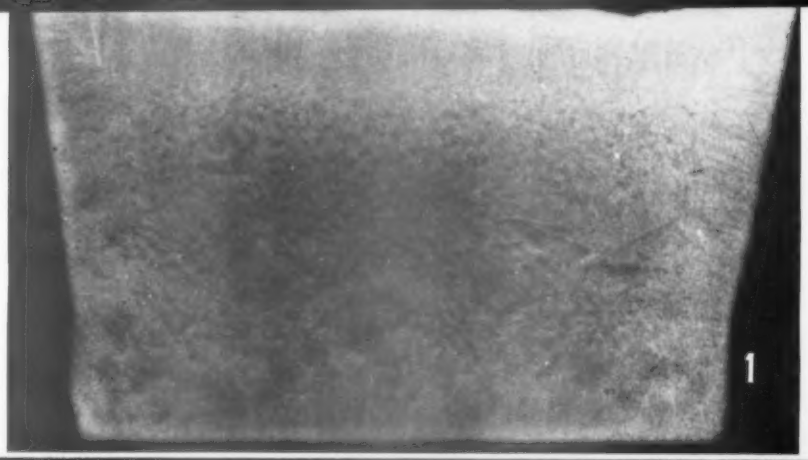
Because of the weaving "worm-hole" nature of these cavities it is difficult to show much in the way of serious unsoundness in any given cross section by ordinary inspection methods even when etched. Radiographic inspection, however, will indicate the extent of any unsoundness, and its general appearance. Figs. 2-6 are radiographs of thin slices from castings similar to the British DTD test coupon for light metals consisting of a 1-in. diameter test section fed by a 2½-inch. diameter sinkhead. All five castings were poured under identical conditions, the only variable being melt quality, or in other words, gas content. Figs. 1, 7, and 8, on the other hand, are radiographs of test castings poured from melts of high quality with no gas present, and the voids are caused solely by shrinkage. Fig. 1 is a standard keel block while Figs. 7 and 8 are of a 4 x 2-in. tee block casting.

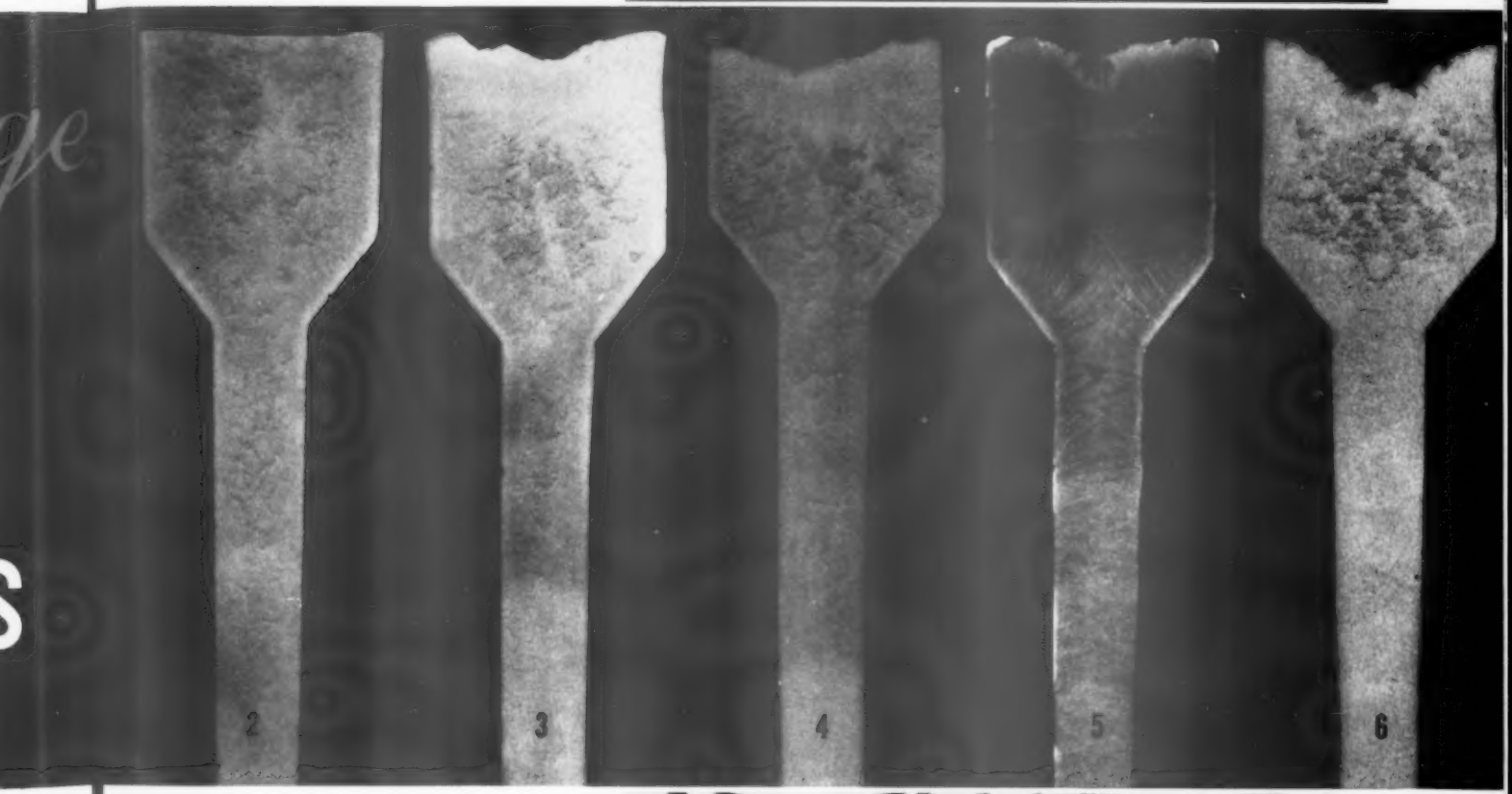
It will be noted that the 3-inch riser in Fig. 8 does not produce a sounder casting than the 2½-in. riser in Fig 7. Fig. 9 is a radiograph of a section of the wall (about ½-in. thick) of a bronze fitting showing how extensive the shrinkage may be. Fig. 10 shows the radiographic appearance of shrinkage in a flange of a 3½-in. fitting. At low gas contents it is difficult to distinguish the presence of gas in castings, but above a certain level the radiographic appearance changes somewhat. Fig. 11 is a radiograph of a casting similar to that of Fig. 9, but here a fair amount of gas is present and gas porosity is indicated.

Castings showing unsoundness similar to Fig. 9 by radiography will, nevertherless, on sectioning appear reasonably sound under visual inspection, a condition, few foundrymen realize. Such insignificant appearing voids are by far the principal cause of leaks in pressure tests as well as failures in tension tests. Figs. 2-6 list the physical properties of each of the five test bars represented by the radiographs, and the strong effect of unsoundness on properties is obvious.

Any test bar should be a measure of melt quality only, and under no condition should normal shrinkage be present. The test bar must be molded not only so that no shrinkage will be present, but also so that gas, if

Fig. 1—Radiograph of Navy M bronze keel block test bar casting showing dense skin columnar dendrites and interdendritic voids

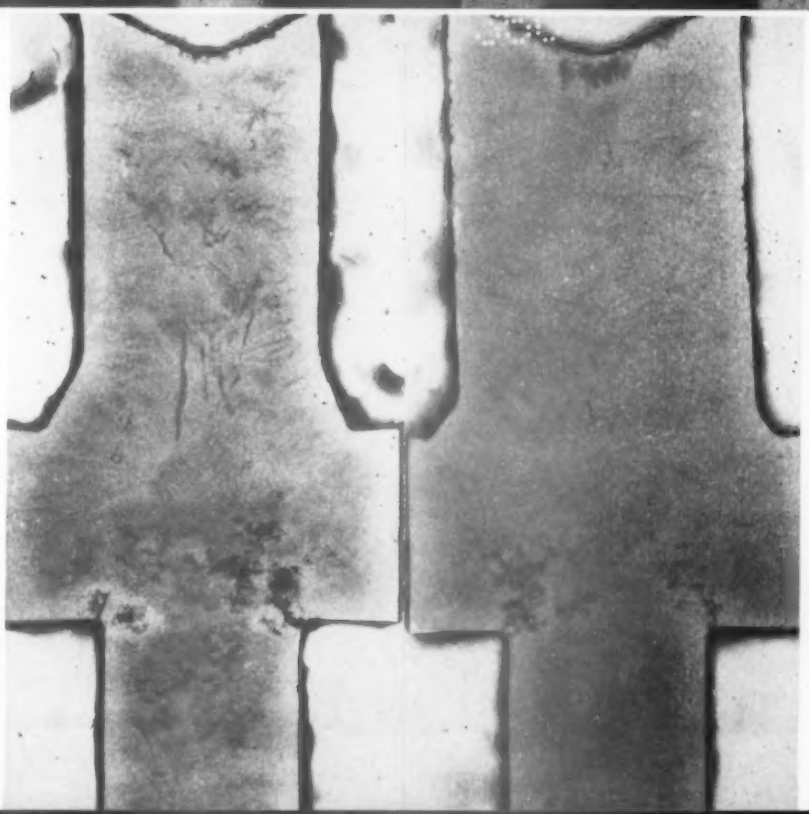


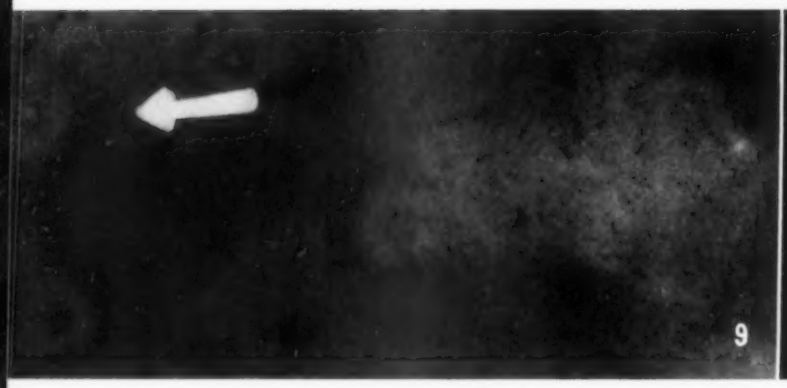


Figs. 2 to 6 are British DTD type test coupons poured from 85-5-5-5 alloy. Fig. 2—30,000 psi, 13 per cent elongation. Fig. 3—28,000 psi, 11 per cent elongation. Fig. 4—34,000 psi, 20 per cent elongation. Fig. 5—39,500 psi, 38 per cent elongation. Fig. 6—41,000 psi, 41 per cent elongation

Fig. 7—4 x 2 x 2 in. tee block casting with 2½-in. riser cast in Composition G. Shrinkage is indicated in both riser and casting

Fig. 8—Similar to Fig. 7, except a 3-in. riser is used. Shrinkage has been eliminated in riser but not in casting





present, will be evolved and yet not allowed to escape. Because castings are not designed with any such set of conditions it is possible to produce sound castings when the test coupon indicates a gas condition. This is possible, of course, only when the casting section is either large enough to permit the escape of all gas, or small enough or possibly chilled enough to prevent the formation of the gas. Conversely however, it frequently happens that bad castings are produced from melts of high quality because shrinkage has not been adequately controlled.

A good example of such a condition is the radiograph in Fig. 5. Although gas was present in the test casting, conditions were such that the gas floated out of the test bar gage sections and excellent physical properties were obtained. Since this is quite likely to occur with somewhat high pouring temperatures, this type of bar cannot be depended upon to indicate consistently the presence of gas porosity.

As has already been indicated, the effect of unsoundness on strength and ductility is considerable, yet if the effect is to be comparable, other conditions must be uniform, for unsoundness is not the only factor in determining the physical properties. Fundamentally, the strength and ductility of a bronze casting are dependent on its alloy composition, its soundness, and its grain size. The relationship of these factors can best be explained by reference to stress-strain diagrams which indicate the amount of stretch or elongation produced in a metal by the application of different loads. Fig. 12, for example, illustrates a typical stress-strain diagram for cast tin bronzes. The shape of this curve is controlled by alloy composition and grain size, soundness having little or no appreciable effect.

Once this curve is established for a given alloy of a given grain size, however, the strength and ductility of any specific casting will depend only on its soundness. That is, how far along the curve a specific test will go depends on its soundness. A perfectly sound bar may break at *C*, for example, while a bar containing porosity will fail at *B*. It is evident from the curve that porosity will markedly reduce ductility as measured by elongation before the strength as measured by psi is affected seriously. Most investigators to date, in discussing the effect of voids on properties, have used tensile-strength values, ignoring the much more sensitive elongation values.

In Fig. 13, actual values have been plotted for Com-

Fig. 12—Typical stress-strain curve for tin bronzes

Fig. 13—Load elongation curves for Composition G and 85-5-5-5 bronzes

Fig. 14—Load elongation curves showing effect of nickel additions on properties of sand cast Composition G bronze

Fig. 15—Radiograph of manganese bronze keel block test bar casting showing localized shrinkage cavity

Fig. 16—Radiograph of 4-in. round Composition G slug cast in open sand mold. It shows shrinkage cavities at bottom and indicates necessity of keeping risers insulated for proper feeding

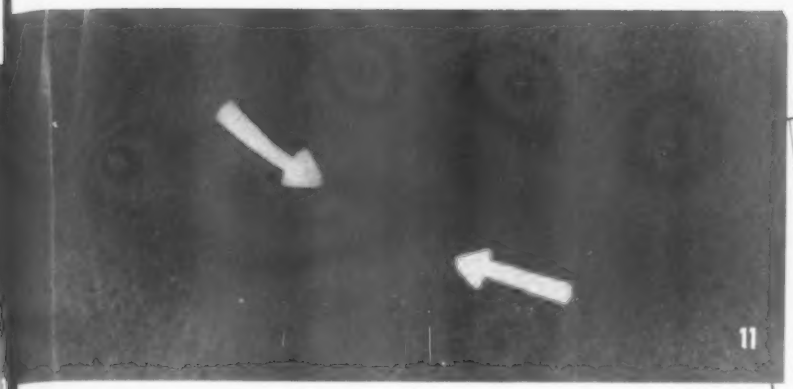
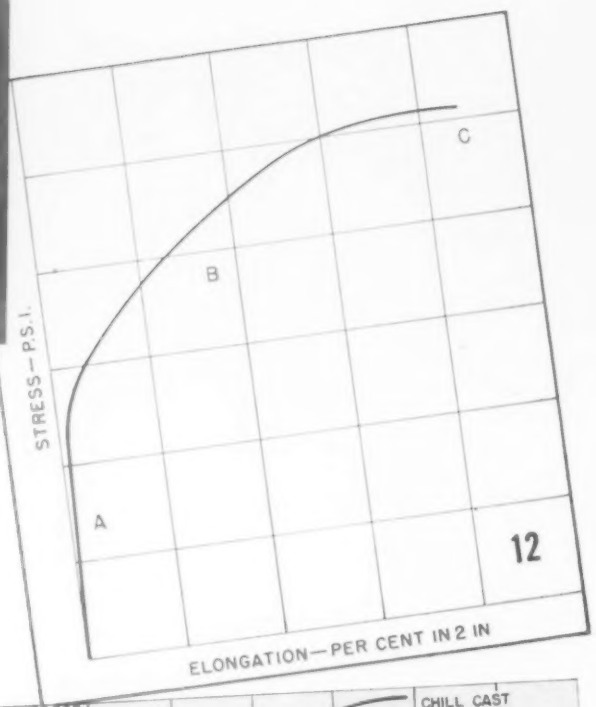


Fig. 9—Radiograph of wall section of Composition G fitting (½-in. thick) showing extensive interdendritic shrinkage. Casting did not leak on hydrostatic test. Arrow points to a radiographic sensitivity gage

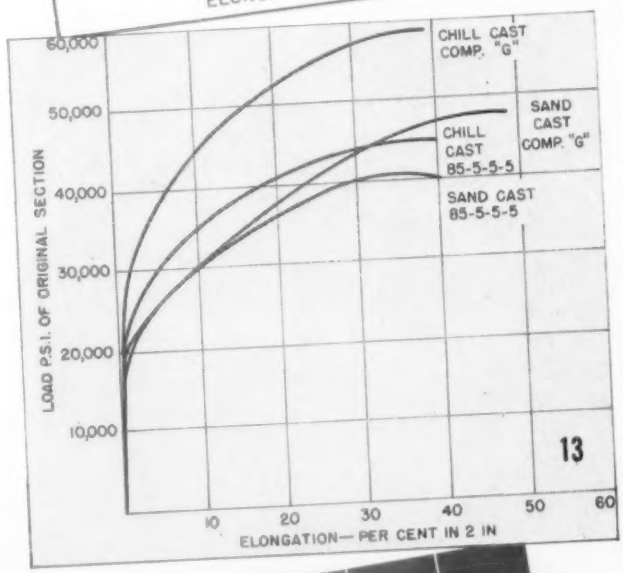
Fig. 10—Radiograph showing shrinkage throughout flange of a 3½-in. low-pressure fitting. This Composition G casting did not leak on hydrostatic test. Arrow is merely a film location marker

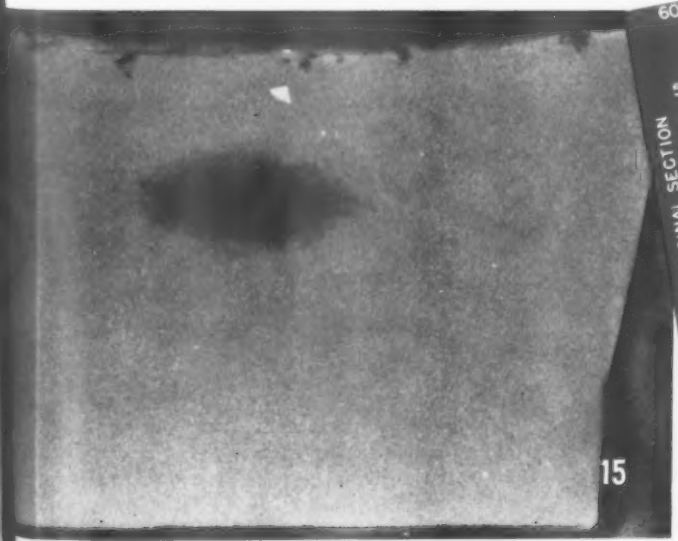
Fig. 11—Radiograph of wall section of Composition G fitting showing presence of considerable gas as well as shrinkage. Casting did not leak on hydrostatic test. Arrows are film location markers

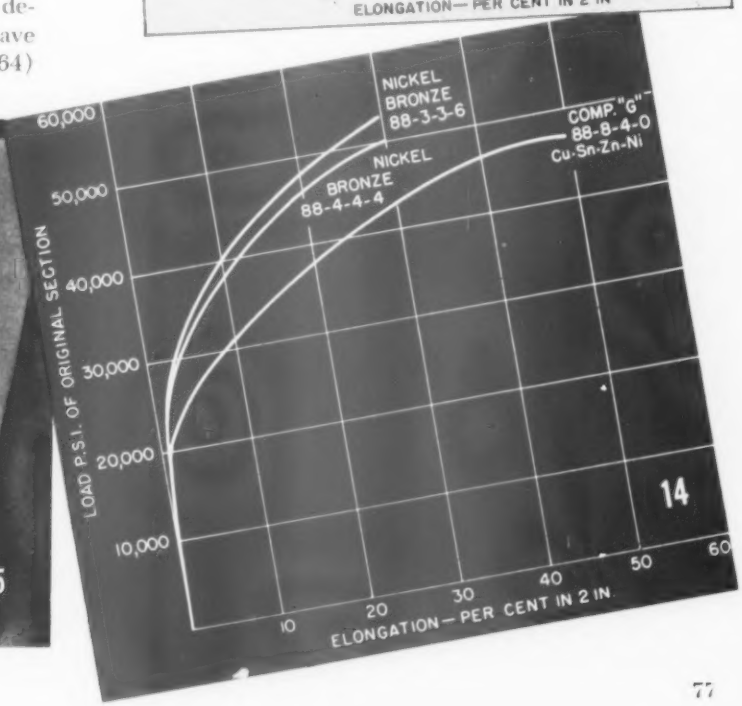


position *G* and 85-5-5-5, both chill cast and sand cast. For the sand castings there is only a slight difference in the curves for the two alloys, the major difference being in their height or maximum strength. The curves for the chill bars show clearly the effect of grain size in increasing the maximum strength of the alloy.

The breaking point of any Composition *G* (88-8-4) or 85-5-5-5 test bar or casting made under conditions applicable to Fig. 13 will be on the curves, the exact position being determined by soundness. The interesting thing to note is the similarity of the *G* and 85 sand cast curves, remembering the dissimilarity of the standard specification requirements of 40,000 psi, 20 per cent elongation for *G* and 30,000 psi, 20 per cent elongation for 85. It is apparent from Fig. 13 that most bars developing 20 per cent elongation in *G* or 85 would have developed about 35,000 psi. (*Please turn to page* 164)







Fundamentals of MOLDING M

This discussion of applications of different types of molding machines is based on a paper presented by the author before a recent meeting of the Detroit Chapter of the AFA

Fig. 1—Stationary-type jolt squeezer machines, in mechanized operation at malleable foundry

Fig. 2—Rollover machine with table in inverted position and pattern withdrawn from mold in 48x48-in. flask. Operation is in magnesium casting plant

Fig. 3—Two rockover-type machines, one at right in rockover position with mold drawn from pattern, one at left returned to jolt position and ready to receive next flask. These units are operated in a steel foundry

MACHINES

By ELMER A. BLAKE
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BECAUSE of the diversity of size and varied requirements of machine molded castings, manufacturers of molding machines are required to design, build and supply a wide range of types and sizes of machines. Each design has its definite characteristics, the ability to perform certain operations, and also certain limitations.

There are approximately 63,000 molding machines in use in the United States and Canada. About 20,000 are jolt squeezer machines; other principal types include jolt rockover, jolt rollover, jolt-stripper, jolt squeeze stripper and jolt rollover squeeze and pattern draw machines.

Jolt squeezer machines on matchplate work are somewhat standard, but on many jobs study is required to decide when the job is of such a nature that it would be more efficient to produce it with cope and drag pattern equipment. The size and design of flask and castings, production requirements, type of co-ordinating equipment, and method of making the molds, generally establish the type and size of machine. When production runs are short, flexibility is desired to meet a range of flask sizes and varying characteristics of the jobs. Either tight or slip, flasks are used and are fitted to run several different patterns, with considerable variation in size. In the majority of cases bottom boards are used.

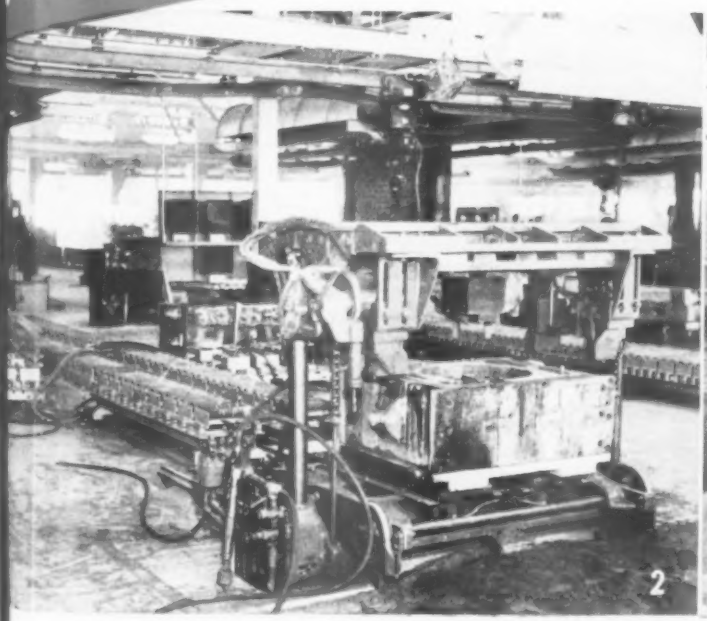
Patterns may be of wood or metal, mounted on either wood, aluminum or cast iron plates, with provisions made for rapid pattern changes. Both cope and drag machines must be designed adjustable to meet these requirements and in some cases portability of the machine is desired, especially when sand is shoveled by hand.

In foundries where high production is required on repetitive work, speed of molding is of prime importance, with flexibility secondary. Pattern and flask equipment should be well designed and constructed. Flasks should be designed to suit the patterns or a range of similar patterns, where conditions permit. Both the cope and drag flasks should be barred, to eliminate the use of bottom boards whenever possible. Jolt squeeze stripping both cope and drag is the speediest molding method, but is limited to flasks of approximately 2000 square inches maximum flask area.

For larger flasks, jolt stripping or jolt rollover pattern draw machines generally are used as problems of machine arrangement and mold handling becomes more involved. While all types of machines are intended to produce molds, a thorough study of the class of work and a more familiar understanding of the characteristics of the machines will result in better production and better quality of castings.

Jolt squeezer machines are available in either portable or stationary designs, Figs. 1 and 4, squeeze cylinder diameters 10 to 18 in. The jolt on this machine is shorter and more rapid. A heavier jolt may spring a matchplate pattern during the operation. The large 16 and 18-in. machines do have a harder jolt, and usually are used in steel foundries, where heavier bonded sand requires a harder jolt. Match plates heavier than the standard thickness are recommended for these larger machines. The table height is important for ease of operation, 27 to 29 in. meeting most requirements.

The 10-in. squeeze cylinder machine leads in popularity at present, but the larger squeeze cylinder machines are gaining rapidly, due to the demand placed on foundries



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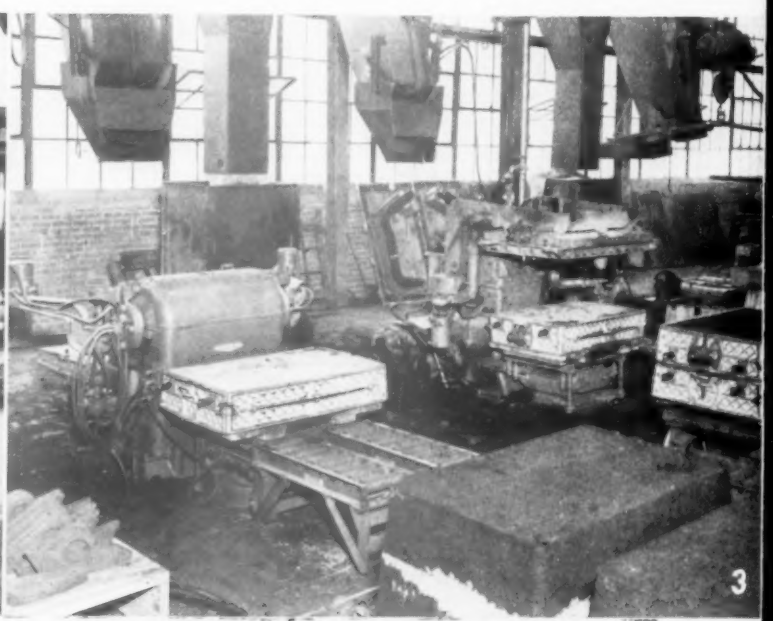

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MOLDING MACHINES

Fig. 4—Jolt squeezer molding machine operated by hand shoveled method

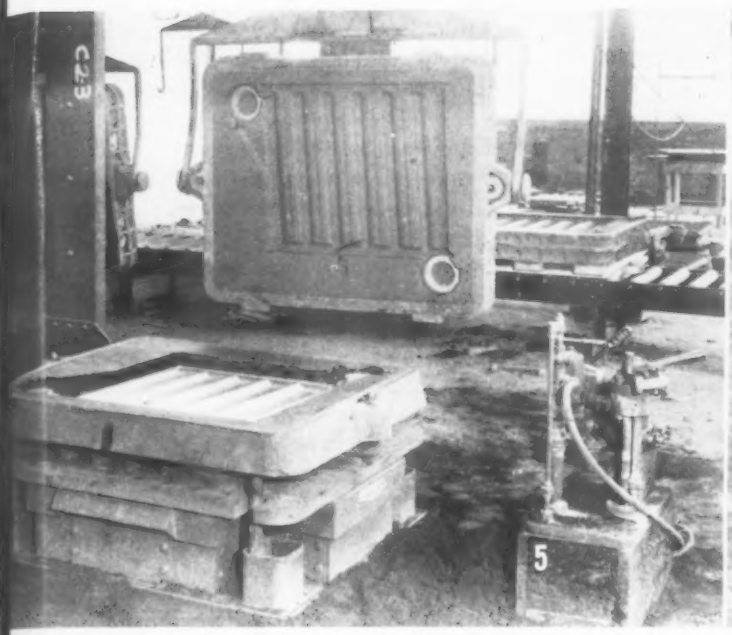
Fig. 5 — Stationcry-type jolt stripper machine handling 40x 50-in. flask for production of gray iron gas heater section castings

Fig. 6—Jolt squeeze stripper installation of lifting-frame type in high-production gray iron work

SQUEEZE PRESSURE CHART

Squeeze Piston Diam (Inches)	Squeeze Piston Area (sq in.)	Total Effective Pressure Developed at Line Pressure of 80 psi With Allowance For Average Load	Squeeze Pressure per Square Inch (80 lbs. Line Pressure at Machine) AREA OF MOLD							
			25	30	35	40	45	50	60	70
10	78.5	5700	228	190	163					
12	113.1	8300	332	276	237	208	185	166		
13	132.7	9800	392	326	280	246	218	196	163	
14	153.9	11200	448	374	320	280	249	224	187	160
15	176.7	12300	492	410	352	308	273	246	205	176
16	201.1	14000	560	466	400	350	311	280	233	200
18	254.5	18000	720	600	514	450	400	360	300	257
19	283.5	19800	792	660	566	495	440	396	330	283
20	314.2	22000	880	734	628	550	489	440	367	314
21	346.4	23800	952	794	680	595	528	476	397	340
24	452.4	31400	1256	1045	896	785	697	628	527	448
28	615.8	43500	1740	1450	1242	1174	966	870	725	621
30	706.9	49100	1964	1635	1402	1228	1090	982	817	701
33	855.3	59300	2372	1973	1690	1483	1316	1186	987	845
36	1017.9	70200	2808	2340	2006	1757	1560	1404	1170	1003

To use table, multiply length and width of mold to get area. Then find mold areas in above table nearest to your area. Squeeze piston diameters and pressures per square inch on mold can then be readily determined.



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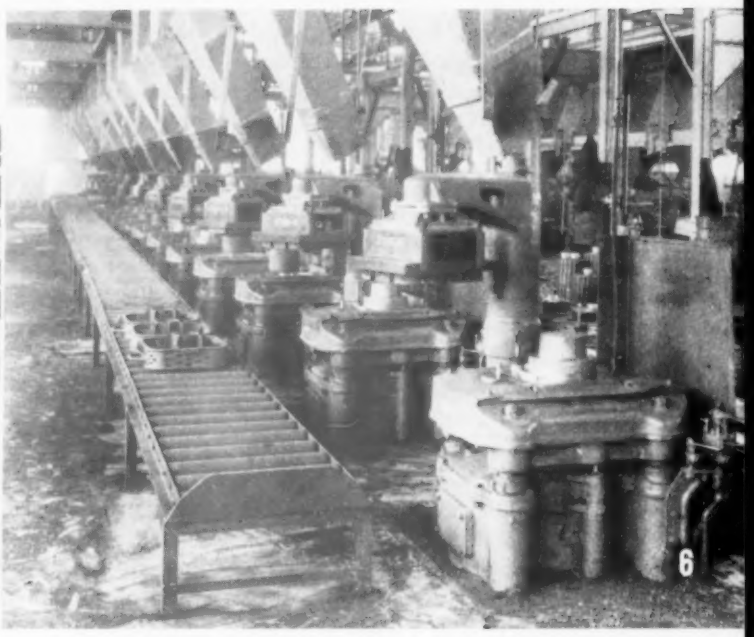

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for greater production of molds for sand castings.

The rockover machine is designed to take a range of flasks, from the small flask that is not too heavy to handle manually, up to flasks weighing several thousand pounds. Smaller machines are built both portable and stationary. Due to the open-end construction and the hinge type rockover principle, large range of flask lengths and depths can be handled. The width is confined because of its design. The table height on this machine is higher than desired when rigged with deep flasks, but it is designed and built as low as engineering principles will permit. Hand clamps or air clamps are available, the latter being the fastest clamping method, but requiring more time in adjusting for changes of flask height.

Describes Operating Principles

The rockover principle involves lifting the mold, pattern and rockover table, through a 180-degree arc from the jolt side to the draw side of the machine. Machine at the right in Fig. 3 is shown in the rockover position and the mold drawn from the pattern. Machine at left has rockover table returned to jolt position, ready to receive the next flask. Due to the high starting torque considerable power must be used, and when the mechanism reaches the apex of the arc this must be transferred to braking power to lower the mold to a position for the start of the draw. The operation must be as rapid and as smooth as possible and has involved considerable study in the design of the machine, especially when handling heavier molds. The hand power rockover machine for medium size molds or cores is limited to approximately 200 lb gross. The weight of equipment and mold should be checked before rigging on hand power units.

The draw mechanism should be well guided to prevent distortion during the drawing of the pattern. In the last few years the trend has been to the hydraulic principle of draw, rather than by air, as the fluid-type draw eliminates pulsation at the start, gives any desired speed of draw, and requires less adjustment when changing from heavy to light molds. The speed of operation on this type of machine is moderate, it offers a great range of flexibility where short runs of production castings are required, and has established its place in foundries of the jobbing and semiproduction type.

The rollover machine, Fig. 2, differs from the rockover in that the mold is rolled practically on its center of gravity. It performs the same class of work as the rockover machines, but fits a range of molds of a larger size, namely, flask sizes 4 ft square up to approximately 6 x 12 ft. Capacities range from 3,000 to 15,000 lb.

After the mold is jolted, butted off and the bottom board clamped or secured, the mold is raised and rolled by power on the table trunnions. The runout car is moved under the mold, either manually or by power, the mold is lowered to the car and the draw takes place by power lifting the rollover table by its trunnions. The mold is moved out to the end of the tracks, the rollover table unlocked and lowered to receive the next flask. This machine has an accurate draw, due to the draw rods being at home in their bearings at the start of the draw. Exceptionally long draws can be made and the machine is normally fast for producing large molds.

With this type of machine there are some limitations, length and width of the mold being limited due to the design. It is a pit-type machine, requiring substantial foundations. The machine is open front and rear, giving the operator room to work from either side and at a low working height. It is ideally suited for large and heavier machine molded castings.

Jolt stripper molding machines of the pin-lift type are designed portable or stationary in smaller sizes, and stationary pit type in larger sizes. The stationary type is shown in Fig. 5. Table sizes range from 20 x 24 in. to approximately 4 x 7 ft. Capacities range from 500 to 10,000 lb.

The pin-lift type of draw has exceptional flexibility

within its range. Hydraulic draw is used on some machines as it is smooth and steady, necessary factors on many cope molds. For the best jolting results rigidly constructed metal patterns or metal pattern plates are recommended wherever possible on all molding machines, as wood pattern plates act as vibration dampeners, and part of the jolt impact is absorbed in wood. In general, stationary jolt machines on good foundations ram better than portable machines. The smaller sizes of machines are well adapted to short run jobs, and larger sizes perform equally well for producing cope and drag molds, for heavier and larger castings.

The jolt squeeze stripper is built in three different designs, with a range of sizes for each design—the lifting-frame type shown in Fig. 6, the lifting-frame with flask rollout shown in Fig. 7 and the pin-lift type shown in Fig. 8. The lifting-frame machine is built with squeeze cylinder diameters from 14 to 33 inches, and is primarily a high-speed production machine. It is built ruggedly to stand up under production schedules upward of approximately 60 molds per hour.

Use Well Designed Equipment

Best results can be obtained with well designed and constructed pattern and flask equipment and served with overhead sand. The molds are first jolted, then squeezed and on the downward stroke of the squeeze piston, hold pistons engage the lifting frame. The pattern mounted on the jolt table is stripped down through the lifting frame, and the completed mold is removed by hand, or with bail and hoist to the conveyor. Then the valve is returned to neutral postion and the lifting frame is lowered to receive the next flask.

All operations on the jolt squeeze strip machine with rolloff, Fig. 7, are identical with the one shown in Fig. 6, with the exception of placing the flask over the pattern and removal of the completed mold. Placing of the flask is done with the rollers in the "up" position and lowered over the pattern by dropping the rollers. The completed mold is rolled out through the machine where the set-off men remove the mold from the rollout device, and either place the mold on the conveyor if the mold is a drag; or in case of a cope it is closed over the drag. The two types of jolt squeeze strippers are for high-speed repetitive work, and are built with squeeze cylinder sizes from 16 to 33-in. diameter.

In rigging patterns and flasks for this type of operation they should be well constructed, as squeeze pressures with a minimum of 40 psi flask area are recommended. In selecting machines for the job, the squeeze piston should be of sufficient size to give the required pressure.

Jolt squeeze pin-lift machines in various sizes from 10-in. piston diameter up will produce practically the same range of work that the lifting-frame type produces. With its adjustability for various sizes of flasks, it meets a demand for the foundry engaged in producing such work as automotive or agricultural castings, where frequent pattern changes are made due to medium production runs. For this type of work, which might normally be run on jolt rockover and jolt stripper machines, a study of the job should be made to determine the advisability of running both the cope and drag on jolt squeeze pin-lift machines as an improvement may be made in both quality and production. In most cases, the same pattern equipment can be adapted.

Jolt rollover squeeze and pattern draw machines are designed to meet the demand for high-speed production of drag molds of such design that the mold must be rolled over before drawing the pattern. Several different sizes are made, with squeeze cylinder diameters from 13 to 24 in. The cycle of operations is as follows: When the flask is filled with sand, by a movement of the valve, the squeeze cylinder rises to a stop and a certain

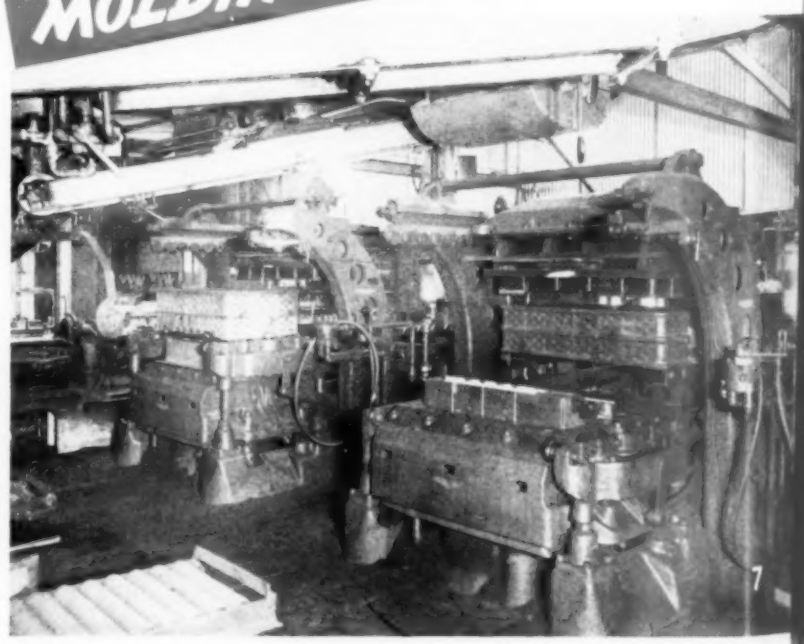


Fig. 7—Jolt squeeze stripper machines with lifting frames and flask rollouts, producing automotive cylinder block molds

Fig. 8—Pin-lift type jolt squeeze stripper machines producing molds for malleable castings in slip flasks

Fig. 9—Jolt squeeze rollover pattern draw machines in foundry producing gray iron brake drums for trucks

amount of the air is by-passed through a port and enters the jolt cylinder, starting the jolt. After the mold is jolted, the valve is turned to neutral, which stops the jolt and lowers the squeeze cylinder. The bottom or squeeze board is placed on the flask. Air clamps are locked and the table and mold rolled over. The valve is turned to the squeeze position, air clamps unlocked, the mold drawn from the pattern on the down stroke of the squeeze piston to a position on rollers where it is pushed through the machine by the operator's foot. The table then is rolled back to normal position to receive the next flask.

The table height on this machine is too high for convenient hand shoveled sand operation. The machine has good flexibility and has a speed which compares favorably with that of jolt squeeze strippers. A typical installation is shown in Fig. 9, a plant producing truck brake drums, indicating the type of mold referred to above where it must be rolled over before the pattern is withdrawn.

Chart Supplies Information

In producing molds on machines, in most cases, best results are obtained by a combination of jolting and squeezing the sand to the required mold hardness. Squeeze pressure for aluminum should be approximately 25 psi of flask area; for brass or light gray iron from 25 psi upward depending on the bond and flowability of the sand; for heavier gray iron from 35 to approximately 50 psi; for steel a minimum of 40 for light castings upward to 70 to 75 psi. A prepared chart of cylinder diameters and areas giving the effective pressures on the flask area, reproduced herewith, is a handy reference.

An example of its use is as follows: Take the case of a light gray iron casting made in a 20 x 20-in. mold, with area of 400 sq in. Following down the column under 25-lb squeeze pressure (suitable for gray iron), 392 sq in. is the closest to 400. Following this horizontal line across to the left, it is seen that a piston with minimum diameter of 13 in. is required, giving a total effective pressure of 9800 lb. If higher squeeze pressure is required, say, 30 lb, the next column of areas indicates a minimum piston diameter of 15 in. is required. If the casting should be steel and a heavier type, a squeeze pressure of about 60 lb should be used. In this case the table shows minimum piston diameter of 21 in. necessary.

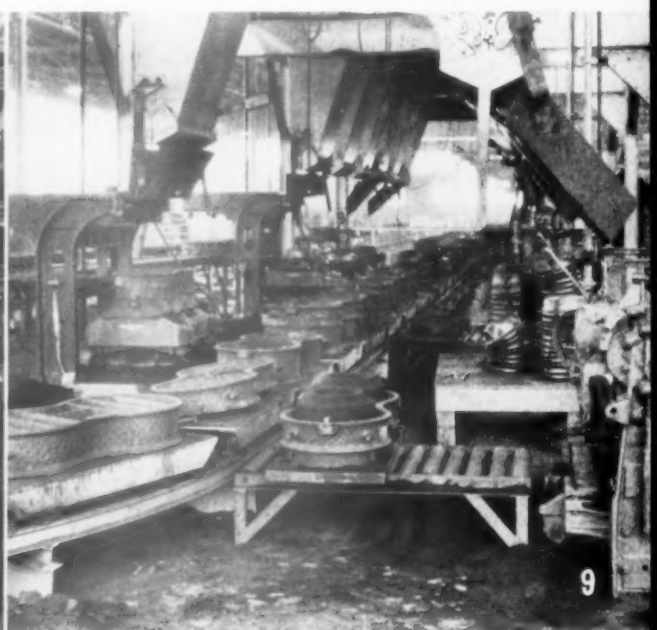
In conclusion, while considerable progress has been made in design and construction of molding machines, progress will continue toward improved machines for the short-run production foundry. For the mechanized foundry on high-production repetitive work, the trend will be toward automatic or semiautomatic special machines to perform the complete operation from loading the empty flask to depositing the completed mold on the conveyor. And this is not too far in the future.

Book Lists Nonferrous Standards

Book of ASTM Standards, Part 1-B, Nonferrous Metals, cloth, 917 pages, 5 7/8 x 9 inches, published by the American Society for Testing Materials, 1916 Race St., Philadephia 3. Price $8.

This volume comprises one of a series of five parts forming the 1946 compilation of all the standards and tentatives formally adopted by the American Society for Testing Materials, and contains only those relating to nonferrous metals and alloys. Nearly 200 standards and tentatives are included and apply to copper and copper-base alloys, aluminum and aluminum-base alloys, magnesium and mangnesium-base alloys, zinc and zinc-base alloys, lead and tin-base alloys, solder metal, nickel and nickel-base alloys, die-castings, electrical-heating resistance and related alloys, metal powders and products, electrodeposited coatings, corrosion tests of nonferrous metals and alloys, general methods of testing nonferrous metals.

Pages in the book are double column style which provides easy reading. Several indexes are included to aid in quickly locating any specification. In one the specifications are listed as to type of metal or alloy; in another they are listed in numerical sequence while in the third they are listed under subject.



Heat Absorption of Molding Sand

By HARRY W. DIETERT
President
EDWARD J. HASTY
Chemical Engineer
Harry W. Dietert Co.
and
R. L. DOELMAN
Sales Engineer
Miller & Co., Chicago

A FOUNDRYMAN is interested in the amount of heat that the mold will subtract from the metal within the mold. The grain size of the metal, soundness and also strength of the casting often are affected by the amount of heat that the sand of the mold subtracted from the metal during solidification and cooling of the casting.

The amount of heat that molding sand can remove from heavy sections of a casting in a limited time is very small compared with the total heat possessed by a large mass of metal. However, in medium and light sections of a casting, the sand is capable of greatly affecting the time of metal solidification and grain size of many metals. Thus the heat absorption of molding sand is more noticeable in light to medium weight castings than in heavy castings.

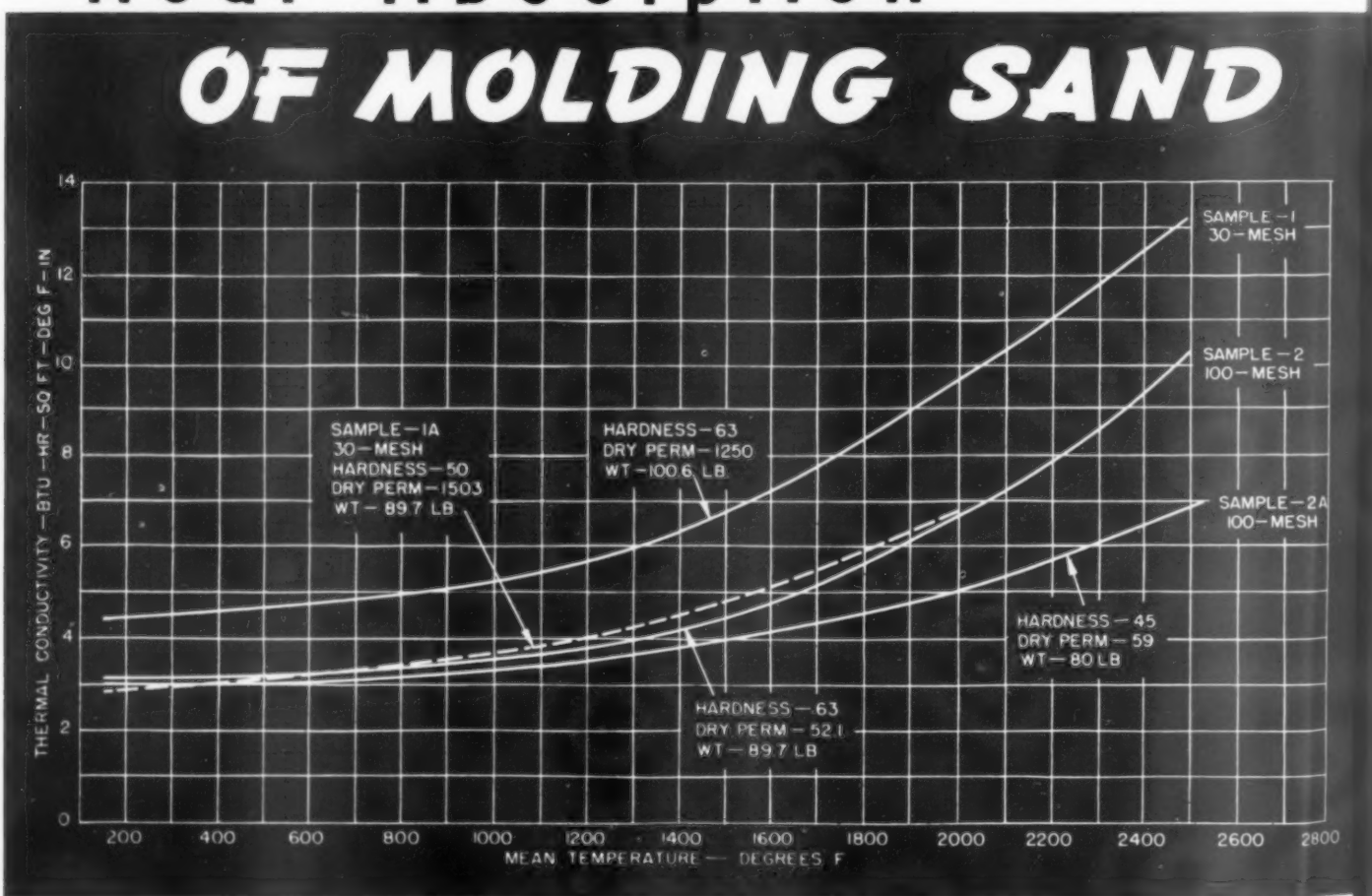
If the solidification of medium and light sections of a casting could be controlled—for example, delayed—then one could obtain better directional solidification of the metal, resulting in stronger and sounder castings.

The authors engaged the services of the J. L. Finck Laboratories to measure the heat conductivity of rammed sand specimens 4 in. in diameter and 1 in. in thickness, in order to make available some technical data on the heat conductivity or, in other words, heat transfer of molding sands possessing specified physical properties.

The heat conductivity tests were made in a circular, flat hot-plate apparatus, with guard heaters at the circumference and bottom of the test specimen. A description of this apparatus is given in the American Ceramic Society *Journal* Vol. 18, No. 1, January, 1936, and Vol. 20, No. 11, March, 1937.

Sand used for the heat conductivity test was washed and dried Ottawa silica sand. The sand was screened to obtain two grades—a coarse grade passing through 30 mesh and retained on 40 mesh AFA sieve, and a fine grade passing through a 100 mesh and retained on a 140 mesh AFA sieve. These two grades of silica sand were bonded with 4 per cent western bentonite using an 18-in. diameter laboratory muller for mixing.

Physical properties of these two grades are tabulated in Table I. Both the AFA 2 x 2-in. test specimen and the



1 x 4-in. diameter heat conductivity specimens were rammed to the same degree of density or weight per cubic foot for each test. Thus, the dry permeability test values of the 2 x 2-in. specimen are applicable to the heat conductivity specimen. The heat conductivity test specimens were dried at 230° F for four hours.

The thermal heat conductivity of a sand is the amount of heat in Btu which will flow in one hour through a square foot area when the temperature gradient is 1° F per inch thickness of sand mold. Thus, thermal conductivity in the English system is designated at Btu per hour per square foot per degree F per inch. In the metric system, thermal heat conductivity is expressed in calories per second per square centimeter per degree C per centimeter. Conversion factors are: 1 Btu/hr/sq ft/deg F/in. = 0.0003445 cal/sec/deg C/cm = 1.240 cal/hr/deg C/cm.

A graphical presentation of the thermal heat conductivity of the coarse and fine grades of molding sand is shown in Fig. 1. The heat conductivity values above 2300° F are estimated. It may be noted that the heat conductivity is materially influenced by the temperature. As the mean temperature of the sand increases, the heat flow materially increases. Thus, the higher the temperature to which the sand is heated by the molten metal, the greater will be the heat subtraction from the metal.

In the heat conductivity test setup, the test specimen is surrounded by heat guards which diminished the flow of air or permeability to a noninfluencing value. Therefore, for practical purposes it may be stated that no heat was carried by convection during the heat conductivity test and thus the permeability of the test specimen did not affect the heat flow.

The heat conductivity test data as shown in this paper are occasioned by heat flow due to radiation and conduction from sand grain to sand grain. A further fact to consider is that the molding sands tested were free of any carbonaceous material such as cereal binder, pitch and seacoal. Such materials, when oxygen is present at or within the face of a mold, may create heat due to combustion. The reverse may also be true—that gases may block heat flow when a large volume of gas is created by a molding material under a reducing atmosphere.

Limiting the discussion to heat transfer due to radiation and conduction within the sand mold, and eliminating heat transfer by convection (*Please turn to page* 228)

Fig. 1 (left)—Thermal conductivity of 4 per cent western bentonite bonded molding sand at temperatures from 200 to 2500° F.

Fig. 2 (below)—Heat conductivity of molding sand bonded with 4 per cent western bentonite when rammed to different densities. Weight per cubic foot

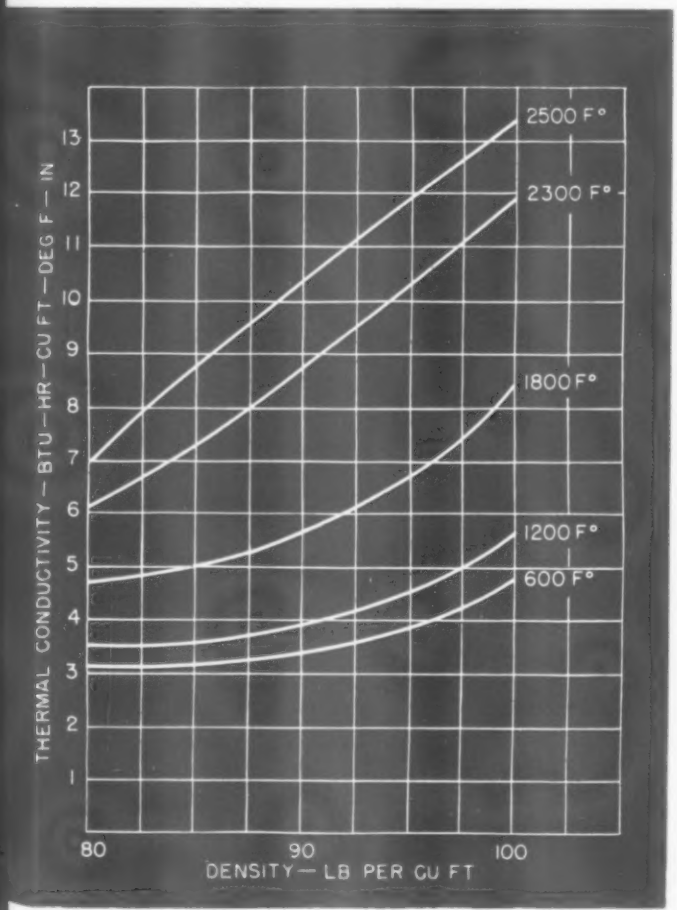


TABLE I—Physical Properties of Sand Tested for Heat Conductivity

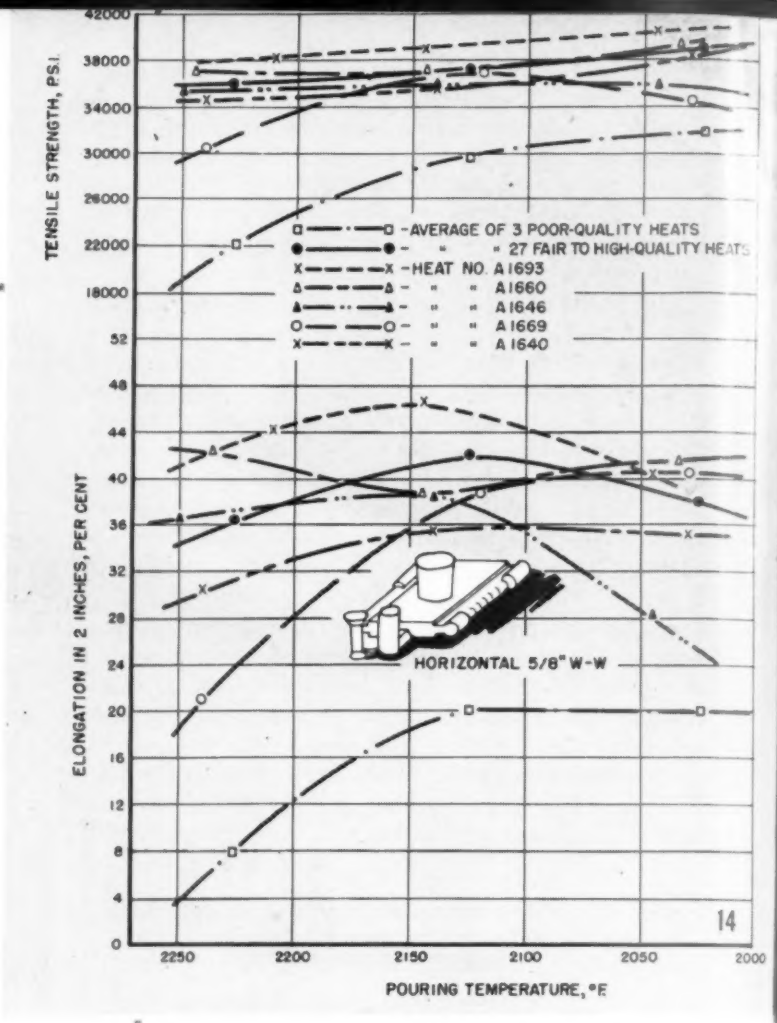
Sand Sample Number	No. 1	No. 1A	No. 2	No. 2A
Grade	Coarse	Coarse	Fine	Fine
Mesh—through	30	30	100	100
Mesh—on	40	40	140	140
Percentage western bentonite	4	4	4	4
AFA green specimen weight in grams	164.1	164.1	140.6	130.5
Dry permeability of 2 in. x 2 in. specimen	1250.4	1503.0	74.5	110.0
Thermal conductivity test specimen size	4" Diam 1" Thick	4" Diam 1" Thick	4" Diam 1" Thick	4" Diam 1" Thick
Thermal conductivity test specimen weight in grams, dry	321.7	274.9	274.9	250.6
Thermal conductivity test specimen volume, cc	205.91	205.91	205.91	205.91
Density as rammed	1.595	1.363	1.26	1.363
Wt/cu ft as rammed	100.6	89.7	89.7	80.0
Test specimens rammed to mold hardness	63	50	63	45
Thermal conductivity at 2300° F	11.9	. .	8.8	6.1
Thermal conductivity at 2000° F	9.7	6.9	6.8	5.1

TABLE II—Heat Conductivity Test Data of 30 and 100 Mesh Molding Sand Bonded with 4% Western Bentonite

Mean Temperature	Thermal Conductivity — Sand Sample Number			
Degrees F	No. 1	No. 1A	No. 2	No. 2A
249.0	. .	. .	3.56	. .
276.6	4.49	. .	. .	. .
283.3	. .	. .	. .	3.20
300.1	. .	. .	. .	3.04
439.8	. .	2.96	. .	. .
599.9	. .	. .	3.44	. .
635.5	. .	. .	3.30	. .
658.8	. .	. .	. .	3.06
688.0	. .	. .	. .	3.02
707.9	4.87	. .	. .	. .
939.8	. .	3.70	. .	. .
1037.8	. .	. .	3.48	. .
1082.4	. .	. .	. .	3.28
1134.6	. .	4.29	. .	. .
1358.6	. .	. .	4.49	. .
1368.5	6.29	. .	. .	. .
1438.5	. .	. .	. .	3.94
1473.0	. .	5.19	. .	. .
1476.6	. .	. .	4.31	. .
1727.4	. .	6.06	. .	. .
1751.6	8.63	. .	. .	. .
1861.0	. .	. .	5.51	. .
1918.8	. .	6.41	. .	. .
2003.1	. .	. .	. .	5.14
2143.8	10.30	. .	. .	. .
2275.3	. .	. .	8.55	. .

By L. W. EASTWOOD
Assistant Supervisor
and
J. G. KURA
Research Engineer
Battelle Memorial Institute, Columbus, O.

Effect of POURING TEMPERATURE on Test Bar Properties of 85-5-5-5 ALLOY



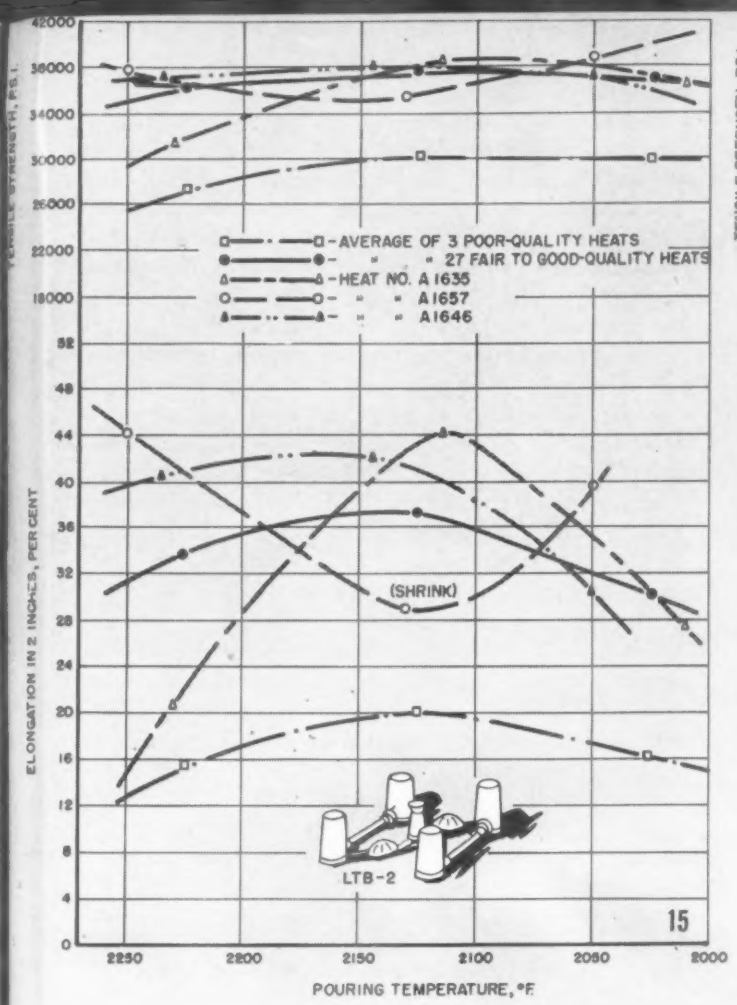
This is the fifth of a series of articles based on investigations sponsored by the Non-Ferrous Ingot Metal Institute

IT IS usually assumed that each test bar design has an optimum pouring temperature at which maximum tensile properties are obtained. During the course of the experimental work conducted for the Non-Ferrous Ingot Metal Institute, a considerable amount of data was accumulated on the effect of pouring temperature on the tensile properties of 85-5-5-5 alloy test bars. Several test bar designs were poured from many melts prepared in various ways, producing, therefore, melts of different degrees of gas content. This paper describes the average as well as representative individual effects of pouring temperature on properties of test bars of five different designs poured from various melts.

The preceding paper, No. 4 in this series, THE FOUNDRY, August, 1947), showed that when using natural green sand containing 6 per cent water and having an AFA permeability of 40, four test bar designs, the horizontal 5/8-in. web Webbert, the L. T. B.-2, the Navy 5/16-in. web Webbert, and the Navy 5/8-in. web Crown, all reflected small differences in melt quality fairly well when the average tensile properties of several test bars were employed. In contrast to these four, a number of other test bar designs did not reflect small differences in melt quality, or the test bar properties were low, apparently because the tensile properties were largely determined by factors other than melt quality. As a result, only the four test bar designs listed above and the modified 5/8-in. web Webbert, which, however, was shown to be rather insensitive to melt quality, will be considered in this paper.

As in previous articles of this series, the term "melt quality" will be used synonymously with "gas content of the melt in the pot." The gas content is measured qualitatively by methods (5) and (7) described in the third article of this series, namely by sectioning and by determining the mechanical properties of test bars.

Melting Method Employed—Although a great many melts were prepared, all of the data presented in this paper are from thirty melts prepared by ten different melting techniques. Each of the melts weighed 300 to



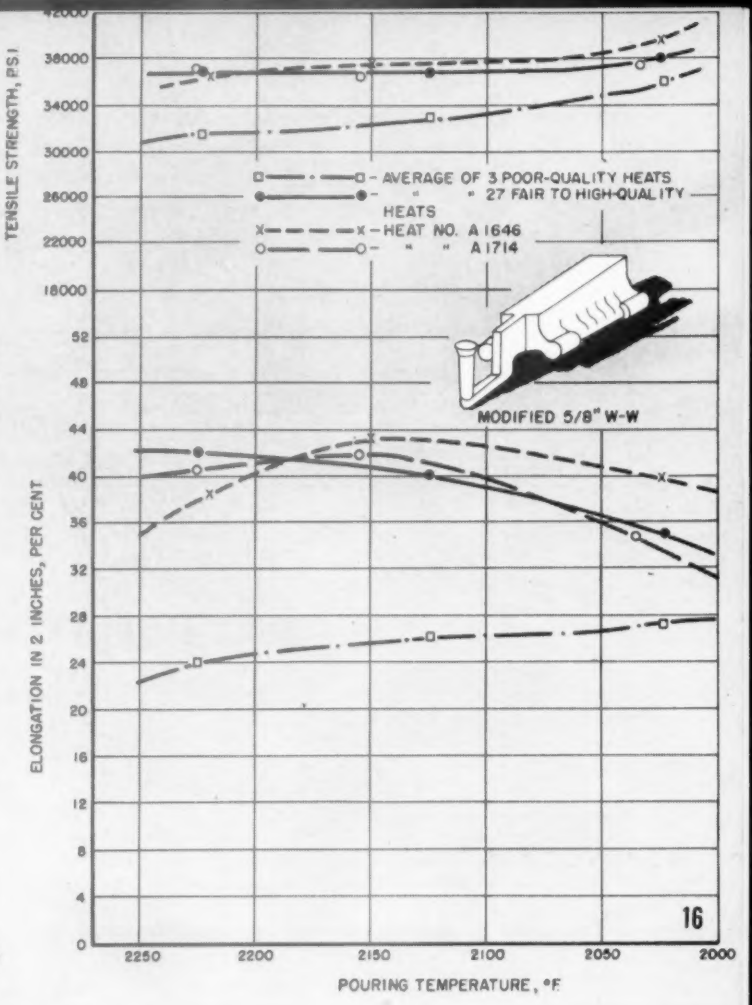


Fig. 14—Average and representative effects of pouring temperature on tensile properties of horizontal ⅝-in.-web Webbert test bar, 85-5-5-5 alloy

Fig. 15—Average and representative effects of pouring temperature on tensile properties of L.T.B.-2 test bar, 85-5-5-5 alloy

Fig. 16—Average and representative effects of pouring temperature on tensile properties of modified ⅝-in.-web Webbert test bar, 85-5-5-5 alloy

350 lb and was prepared in four different furnaces, employing two different charging methods for three of the four furnaces. The melts were prepared in triplicate, and no cover was employed on any of the melts, excepting the three which were melted under a glass slag in a high-frequency induction furnace lined with clay graphite. Zinc, to restore the zinc loss, and 2 oz of 15 per cent phosphor copper, for deoxidation, were added to the pouring ladle during the transfer of each of the melts. Though the triplicate heats made by a given melting method produced fairly satisfactory checks, the ten variations in melting technique produced very substantial differences in melt quality. While it should not be construed that a glass cover is harmful under all melting conditions, the three melts made under a glass slag were of definitely poor quality, but the remaining 27 melts prepared under the other nine melting conditions, not utilizing a glass slag, produced melts of good to excellent quality.

The precise methods of making the melts have been described elsewhere[51] but the main features are again noted as follows:

Four different furnaces were used: a 300-lb capacity, high-frequency induction furnace lined with silica; a 300-lb capacity, high-frequency induction furnace lined with clay graphite; a 350-lb capacity, tilting gas-fired pot-type furnace equipped with a clay-graphite crucible; and an 800-lb capacity, barrel-type, gas-fired, rocking furnace lined with firebrick. The charge consisted of 50 per cent remelt gates and risers and 50 per cent new secondary ingot of 85-5-5-5 alloy from a single reverberatory heat.

Melts were prepared in triplicate and two methods of charging were employed, designated as the C_1 and C_2 methods. Only the C_2 method was used in charging the barrel-type furnace, but both methods were employed in charging the other three furnaces making a total of seven different melting methods. By the C_1 method of charging, about 40 per cent of the metal in the form of the finest scrap was placed in the bottom of the crucible and melted. As soon as this portion was entirely molten, about 10 per cent of the remaining charge was added in six successive additions after each preceding addition had completely melted. By the C_2 method of charging, the crucible was filled with the finest scrap and larger pieces placed on top. As the charge melted down an additional portion of the charge was added to keep the crucible full until the entire charge was melted.

Employing both charging methods, triplicate melts were also made using 5 per cent turnings in a charge melting in a high-frequency induction furnace lined with silica, thereby producing two more melting methods. With the exception of three melts prepared in the high-

frequency induction furnace lined with clay-graphite, all of the melts were prepared without any flux cover. Using the C_1 charging methods, these three melts referred to were melted, held, transferred, and poured under a suitable slag consisting of glass and borax. This melting procedure brings the total number of different methods employed to ten. All of the melts were transferred to a pouring ladle, and during this operation the zinc lost during the melting was restored by adding about 0.25 per cent zinc to the stream of metal during the transfer. Two ounces of phosphor copper per 100 lb of metal also were added to the stream of metal as it was transferred to pouring ladle. At least three minutes elapsed from the time the phosphorous was added until the first mold was poured.

The effects of the ten separate melting conditions on the melt quality may be summarized as follows: The charging method had no noticeable effect on melt quality when melting in a high-frequency induction furnace lined with a silica crucible. However, when melting in a clay-graphite crucible in either the high-frequency induction furnace or the gas-fired furnace, the C_1 method of charging produced melts of slightly higher quality than the normally used C_2 method.

The high-frequency induction furnace lined with silica produced only slightly better properties than those obtained in the high-frequency induction furnace lined with clay-graphite providing the C_1 charging method was used for the latter type of furnace. A gas-fired barrel-type furnace lined with firebrick produced a melt quality almost comparable to that obtained in the high-frequency induction furnace. However, the gas-fired tilt furnace, equipped with a (*Please turn to page* 175)

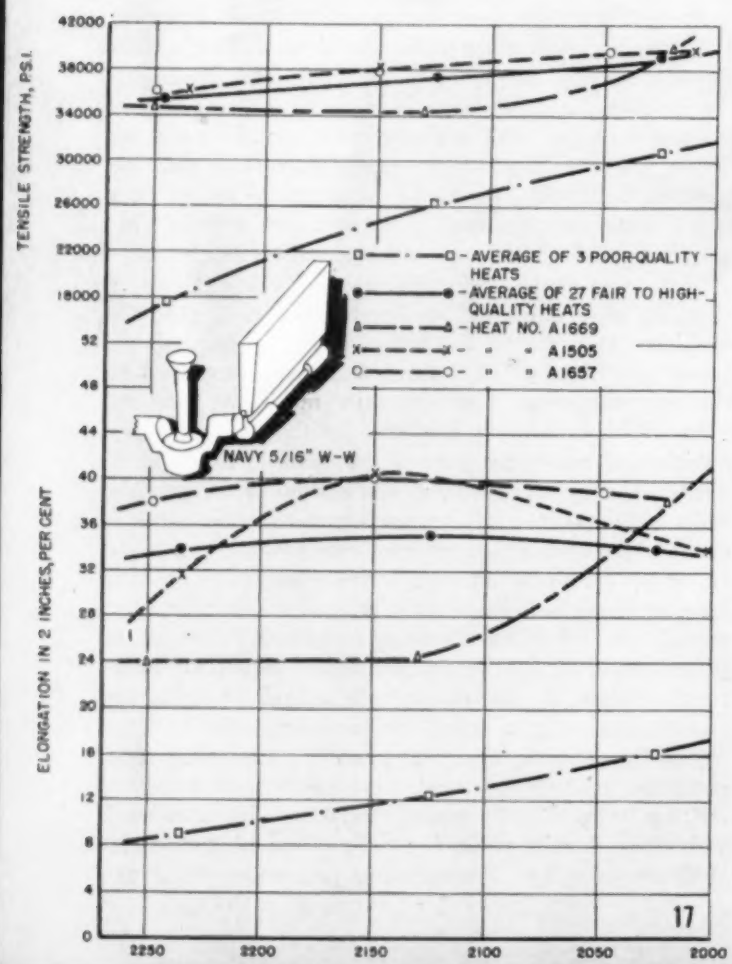
TABLE VII—Relation of Test-Bar Design and Pouring Temperature to Per Cent Defectives*

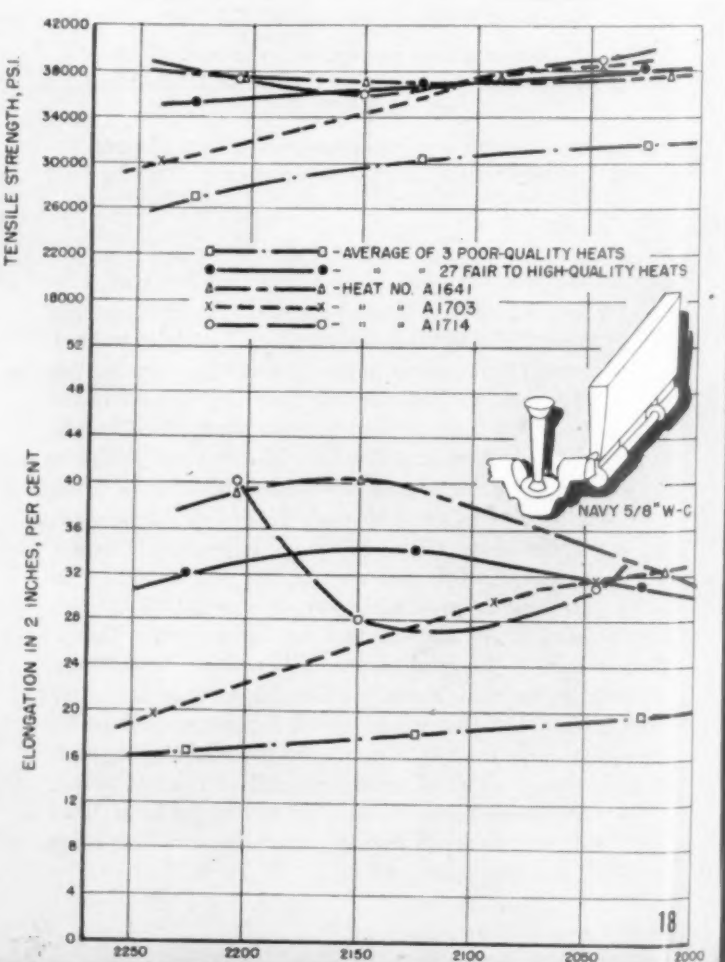
Design	Approximate Pouring Temperature, °F	—Per Cent Defectives— Dross	Shoulder Fractures
Horizontal 5/8"-web Webbert	2225	0	4.32
	2125	0	3.70
	2025	2.47	1.23
	Total	2.47	9.25
L.T.S-2	2225	0	1.85
	2125	0	1.85
	2025	1.23	0
	Total	1.23	3.70
Modified 5/8"-web Webbert	2225	0	1.23
	2125	2.47	4.32
	2025	6.79	6.79
	Total	9.26	12.34
Navy 5/16"-web Webbert	2225	0	1.23
	2125	1.23	4.94
	2025	2.47	4.32
	Total	3.70	10.49
Navy 5/8"-web Crown	2225	0	1.23
	2125	0.62	1.23
	2025	3.70	0.62
	Total	4.32	3.08

*Out of a total of 54 bars for each design and each pouring temperature.

Fig. 17—Average and representative effects of pouring temperature on tensile properties of Navy 5/16-in.-web Webbert test bar, 85-5-5-5 alloy

Fig. 18—Average and representative effects of pouring temperature on tensile properties of Navy 5/8-in.-web Crown test bar, 85-5-5-5 alloy





SELLS THE *American Way* of Doing Business

A NEW AND unusual method of acquainting boys with the processes by which a manufacturing business is conducted was employed this summer by a noncommercial foundation sponsored by Lehigh Foundries Inc., Easton, Pa. It consisted of two laboratory-demonstration courses of three-weeks duration each, planned to give an intimate, inside view of modern manufacturing and business procedure and a better understanding of human relationships and obligations in industry. Thirty-five boys 15 years old and up were enrolled in the first course, and 30 were included in the second group.

Frank E. Shumann, president of Lehigh Foundries Inc., established the foundation as a living memorial to his son, Frank E. Shumann Jr., who was killed in World War II. In explaining the purpose and operation of the course, Mr. Shumann points out that "in this narrowing, industrialized world no man can follow his chosen profession unaffected by the fortunes of others. The state of business affects the state of the nation—and the state of the nation affects the doctor, the dentist, the engineer, the businessman, or the mechanic.

"The course of instruction followed in the course is not intended to make business men, technicians, accountants, salesmen, credit men, or mechanics out of students—nor to influence them in their choice of a vocation. The purpose of the course is to create mutual understanding of each other's problems. The boys who spend this time observing 'industry at work' will have a better understanding of the problems that affect the normal interchange of ideas and commodities throughout the world.

"We in industry are well aware of the need for this sharing of mature experience and knowledge with those who later will (*Please turn to page* 128)

FRANK E. SHUMANN
President
Lehigh Foundries Inc.
Easton, Pa.

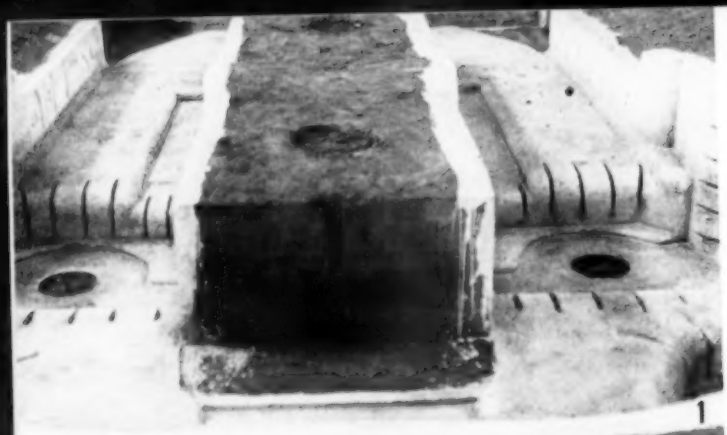
Right—Interest was high in the vending machine division of Lehigh Foundries Inc, Easton, Pa.

Below—The first class of high school boys enrolled in the laboratory-demonstration course sponsored by Lehigh Foundries Inc.

Wartime Plant Makes

Large Steel Castings

For Peacetime Uses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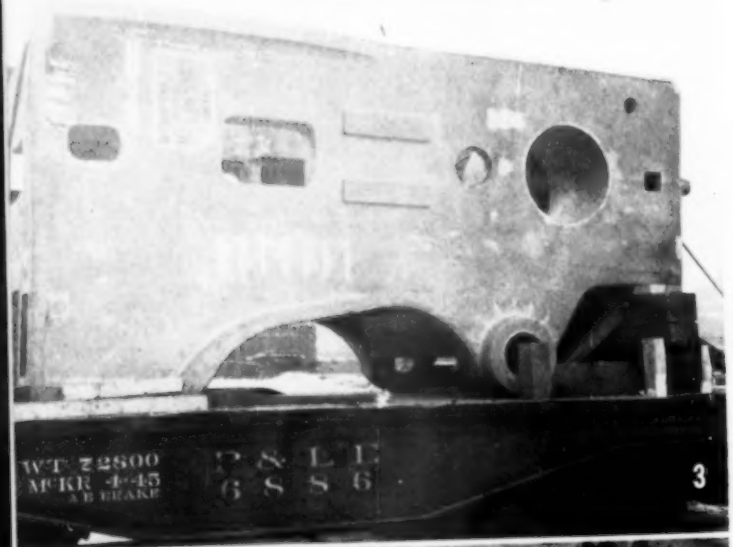

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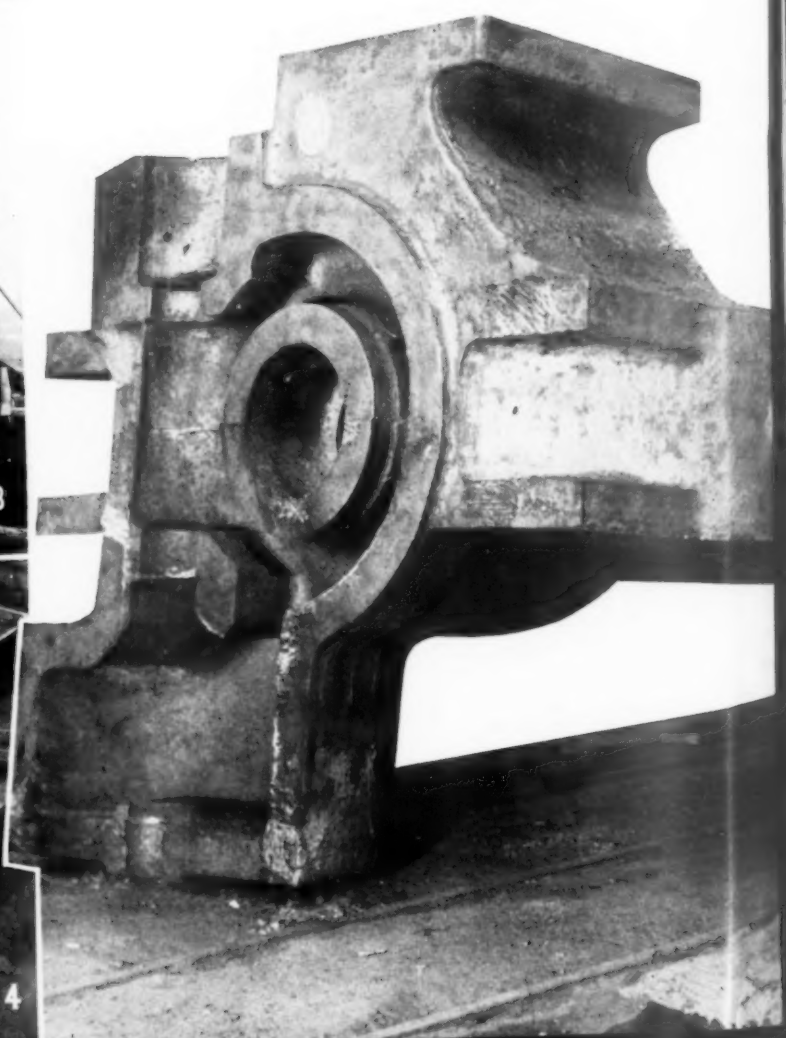


AS WITH many other industrial organizations, the United Engineering & Foundry Co., Pittsburgh, is a combination of several older firms. The company was incorporated in 1901 by a consolidation of the Frank-Kneeland Machine Co., Lincoln Foundry Co. and McGill & Co. of Pittsburgh, and the Lloyd-Booth Co., Youngstown. The last named is the oldest, having been established in 1849 by Parmalee and Sawyer as an iron foundry for the manufacture of stoves. United now operates plants at Vandergrift, Pittsburgh, and New Castle, Pa., and at Youngstown, Canton and Akron, O. In its iron and steel foundries, machine shops and plate fabricating shops, the company has turned out a tremendous tonnage of rolling mills, rolls, forging presses, and a miscellaneous variety of other heavy equipment—in addition to wartime production of guns and shells.

Into the excitement and hubub of the latter part of 1941, when Lend Lease and domestic orders threatened to swamp the shops and when salesmen were rated by the number of orders they could turn down, representatives of the War Production Board requested United on behalf of the Defense Corp. to build and operate a new plant for the production of large steel castings, heavy machinery and equipment to take care of the imminent and anticipated flood of Army, Navy and Maritime orders. After a careful survey, and as a result of several interesting factors, which lie outside the scope of the present discussion, a 52-acre site in New Castle, Pa., was selected for the huge project.

First concrete for the machine shop foundation was poured Apr. 18, 1942. First structural steel was erected three months later, and at the end of another three months of feverish activity, the first steel heat was poured in the foundry. Early in February, 1943, United took over operation, in a plant including machine shop, foundry, pattern shop and modern offices reflecting long hours of careful planning. In ideal layout and arrangement the plant is equipped to handle any size machine or foundry job. A recently completed steel casting, the frame for a forging press, estimated weight 236 tons finished, is claimed to be the largest steel casting in the world. Several interesting features connected with the production of this casting were presented in the May issue of THE FOUNDRY. Interesting examples of several other large steel castings recently completed are shown in the accompanying illustrations.

As a result of orders from the Ordnance Department in May, 1944, several shell lines were equipped and placed in operation. Production was under way in December on a monthly schedule to turn out 100,000, 155-mm shells and 50,000, 8-in. shells. In addition the plant built forty-nine 240-mm howitzers, the largest type gun in use by the U. S. Army. The gun weighs 12½ tons and has a barrel approximately 28 ft long. Conceived, born and operated as a war product, the plant fulfilled expectation in a highly satisfactory manner and now is engaged in producing material and equipment for an industrial era where the war drums throb no longer and the battle flags are furled.

The United plant in New Castle reflects foundry good housekeeping practice to a commendable degree. The two-story general office building faced with light buff colored brick, reflects the views of an architect who also was an artist. The long, wide and spotless yard separating the office from the foundry building, and the inside and outside of the foundry and machine shop, have a little the edge on the mythical "Spotless Town" which owed its condition to a magical cleaning compound extensively advertised in newspapers, magazines and on bill boards throughout the country many years ago. Old horny-handed sons of Vulcan will remember

Fig. 1—Open mold for casting 90-ton blooming mill housing

Fig. 2—Showing core arrangement in mold for 27-ton corner casting used on a large shovel

Fig. 3—Cast steel frame for 95-ton forging press

Fig. 4—Open mold for 35-ton shell ring

Fig. 5—Roll housing, weight 100 tons, in process of finishing

By PAT DWYER
Engineering Editor
THE FOUNDRY

the frenzied, two-day cleaning up program to make the plant presentable in expectation of the annual visit of the president and board of directors for 15 minutes between trains. Every day at this highly modern plant is clean-up day.

The foundry building, 380 x 1254 ft., amply lighted and ventilated through windows in the walls and roof, is divided into six full length main bays which are, beginning at the east side, 60, 80, 40, 80, 40 and 80 ft wide respectively. Five annealing furnaces, a shot-blast chamber and a hydroblast installation occupy space in the north section of the first bay. Four acid-lined, oil-fired open-hearth furnaces, one 35 ton, two 50 ton and one 100 ton capacity, are located near the south end of the same bay with the tapping spouts at the back opening into the adjoining bay to the west. The elevated charging floor serving all the furnaces is on the opposite side.

Incidentally—and merely as an illustration of the loose and random manner in which terms are used in the foundry industry—it is interesting to note that with a cupola in a gray iron foundry, the charging plaform and charging door are at the back and the tapping spout is in front. The tapping spout on an open-hearth furnace where steel is melted is in the same relative position as the spout on a cupola so far as filling the ladle and removal of the metal are concerned, but when men work around the spout, they are said to be working at the *back* of the furnace. The other side with the charging doors and charging floor is known by one and all as the *front* side. From a logical standpoint the steel nomenclature would appear to be the more accurate and appropriate.

While a considerable degree of skill and knowledge is essential on the part of the men who operate the open-hearth furnaces, most of the old-time heavy and laborious work, with the exception of making and repairing bottom of the furnace after each heat, now is done by mechanical equipment. An electrically-operated charging machine travels back and forth on the floor in front of the furnaces. A ram on the charging machine engages the end of a charging box, lifts the box from the buggy, inserts it into the furnace, empties the box by rolling it over, and then withdraws the box and places it on the buggy. By utilizing several doors the charge is spread over the entire furnace hearth. Furnace doors are opened and closed pneumatically. Reversing valves which direct the flame alternately from oposite ends of the furnace are controlled automatically and mechanically. Recording instruments on a panel indicate through dials the fuel oil pressure and volume.

A 10-ton capacity crane on a runway over the stock-yard outside the building loads raw material into charging boxes mounted on a train of buggies, which then are hauled to the charging floor and spotted in front of the various furnaces according to requirements. Fuel oil for the melting furnaces and annealing furnaces is piped from tanks having capacity of 1,000,000 gallons or, allowing the average 55 gallons to the barrel, 18,182 barrels. The tanks are buried in the yard. Drying ovens are gas fired.

The second bay, 80 ft wide, where the largest castings are molded, poured, shaken out and cleaned is spanned by nine cranes varying in capa- (*Please turn to page* 212)

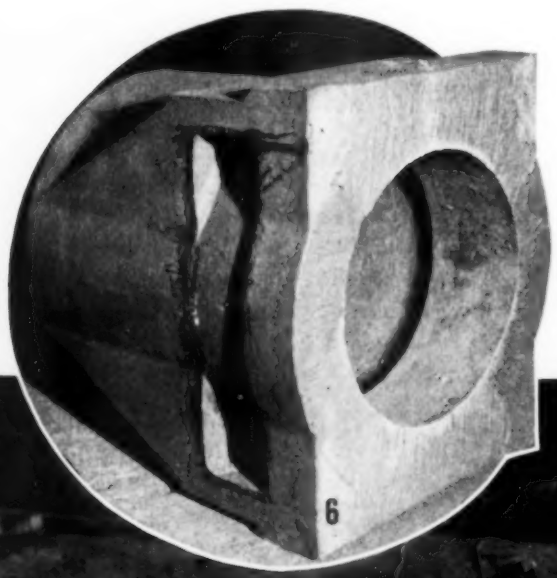
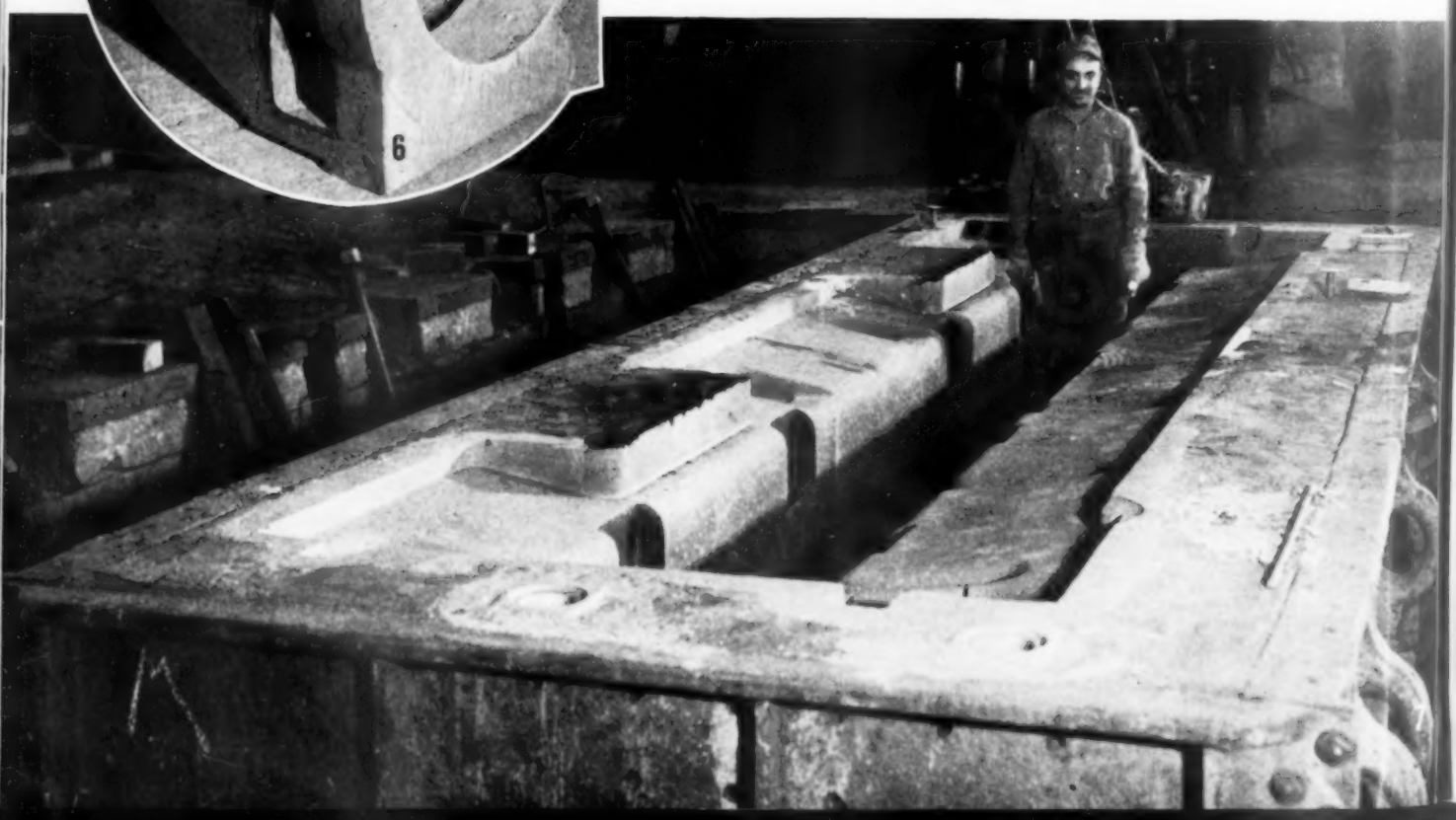


Fig. 6—Hydraulic cylinder casting. Fig. 7—Open mold for casting 35-ton housing bedplate



Selecting Proper Pattern Equipment

By RAY OLSEN
Production Pattern & Foundry Co.
Chicopee, Mass.

PATTERNS can be constructed of several different materials and in a number of different fashions, but one of the ever recurring questions concerns how much should be spent on a pattern. In many cases it is felt that patterns are a necessary evil, the cheaper the better.

Often a manufacturing establishment will spare no expense in some phases of its operation, and after considerable preliminary expense a saleable product is developed. This product is designed with an eye toward machining and assembly cost, and frequently skilled tool engineers work with the designers on every detail and dimension. Then the tool engineers design and build expensive jigs, tools, fixtures and even special machines to reduce manufacturing time to a minimum. They have concentrated on this phase of production because it has been more costly than raw material. The engineering and tooling cost, when prorated over a period of time still shows a marked saving in cost of finished product.

Actually, castings also are raw material and patterns are tools. Reduction in machining and assembly cost now have swung the pendulum in the other direction, and today raw material costs are the dominating factor. It is going to be increasingly necessary for foundrymen and patternmakers to work with engineers on casting design. In too many cases the foundry is supplied with a pattern that will make the desired casting but make it at a good deal more cost and trouble than should be necessary.

In many shops wood models are very helpful from an engineering, foundry and pattern standpoint. On all the larger patterns at our shop the pattern leadman makes up this scale model when he first studies the blueprint. Little time is required to cut and assemble the model; most of the time involved is in interpreting the print. In every case we have used these models in discussing interference and changes with the engineering department and also molding practice and corebox construction with the foundry. In addition, a model helps to make it possible to use a number of patternmakers on any specific pattern construction by showing them on the model that portion they are to make. In some cases these models are used by the tool designer and machine shop supervision to assist in building jigs and fixtures and layout machining operations.

In most foundry operations there is (*Please turn to page* 215)

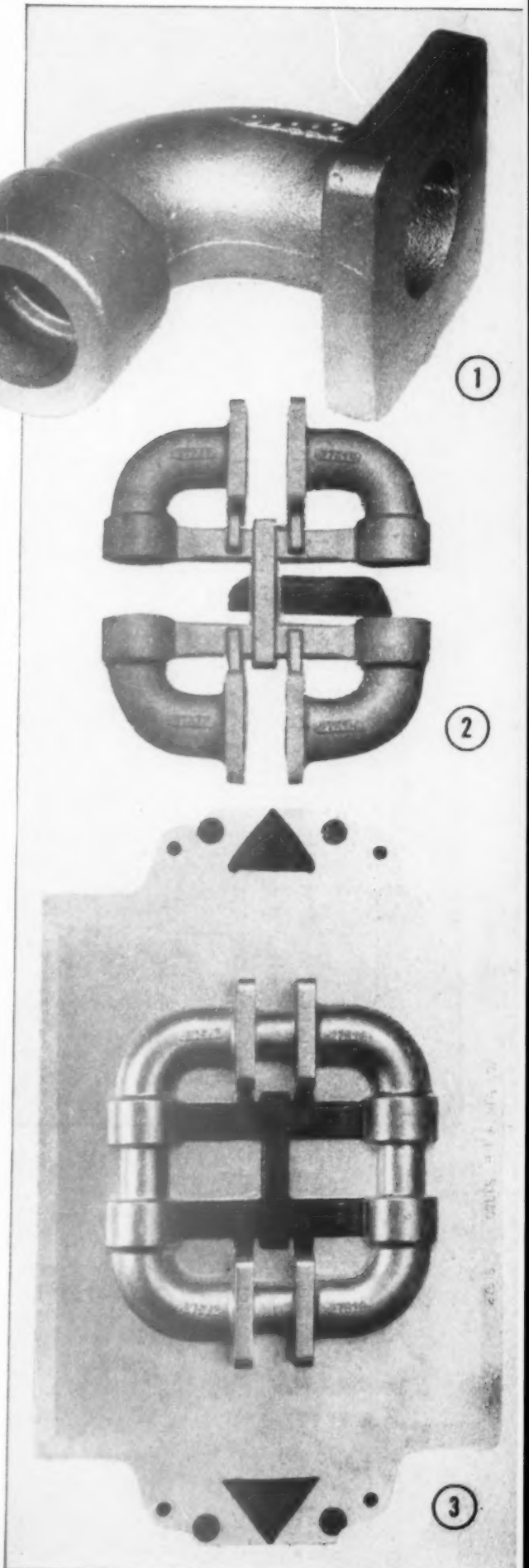


Fig. 1—This elbow casting may be made from a loose pattern if required quantity is small, or from a matchplate (Fig. 3) mounting four patterns when a longer run is involved. Castings made from matchplate shown in Fig. 2

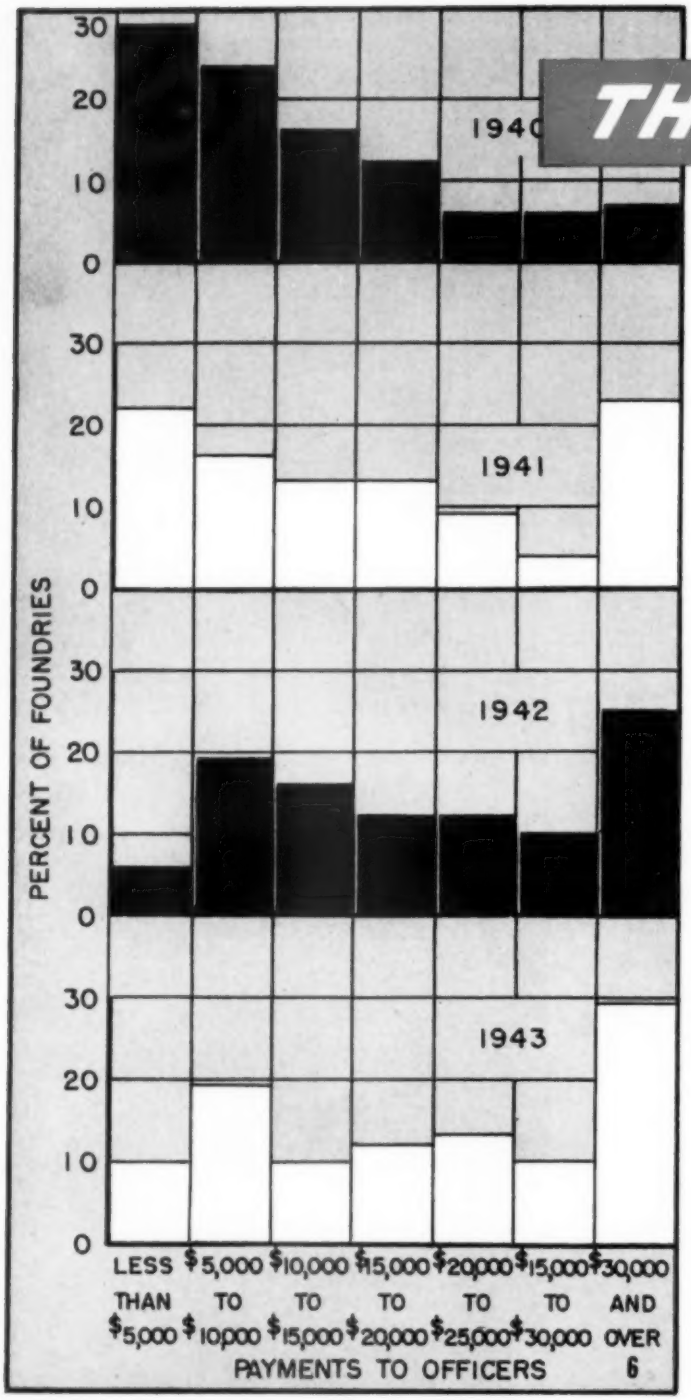


Fig. 6—Percentage distribution of 68 brass and mixed metal foundries according to annual payments to officers in 1940-1943

Fig. 7—Percentage distribution of 68 brass and mixed metal foundries according to ratio of officers' payments to net dollar sales in 1940-1943

THE NONFERROUS

This third and concluding discussion of OPA statistics considers nonferrous foundry cost and profit ratios during 1940-1946. Foundries dealt with are only those subject to RMPR-125 in 1943 or 1944 and, unless otherwise noted, include only companies principally engaged in selling nonferrous castings. The brass foundry sample does not include companies specializing in railway journal bearings or ship propellers

IN COLLECTING cost data from nonferrous foundries, the Office of Price Administration used a very simple breakdown of total costs: Metal cost, including metal loss; production labor cost; other manufacturing costs; and all other expenses. Payments to officers or owners were not included in any of these cost items for reasons made clear later.

These four cost items were defined on the questionnaire forms as follows:

1: Metal cost: Metal contained in finished casting plus metal lost in production, valued at purchase price; that is, metal purchases, adjusted for amounts taken from or added to inventory.

2. Production labor cost: All payments to labor of the rank of foreman or lower, excluding administrative, supervisory, sales, technical and office personnel.

3. Other manufacturing costs: Supplies (sand, oil, crucibles, etc.), patterns, fuel and power, superintendence, payroll taxes, compensation insurance, insurance and taxes on foundry plant and equipment, repairs and maintenance, outside work, freight and express, and other similar expenses incurred in the production of castings sold.

4. All other expenses: General, administrative and selling expenses (including office salaries, salesmen's salaries and commissions, auditing and legal expense, postage, stationery and supplies, telephone and telegram, traveling expense, and advertising) plus all other expenses not reported under manufacturing costs, excepting payments to officers or owners.

This breakdown oversimplifies the cost structure of many foundries. The use of a more detailed schedule could not be justified, however, since this simple breakdown was sufficient for the needs of the agency, and since comparable data for a finer breakdown could not have been obtained without increasing the burden upon reporting foundries. In general, metal is the most important of nonferrous foundry costs and labor the second most important. These two cost items together account for roughly 85 per cent of the total manufacturing costs of brass foundries. General, administrative and selling expenses, exclusive of officers' salaries, are frequently of minor importance. In view of this and in view of the apparent failure of many foundries to distinguish clearly

FOUNDRY INDUSTRY—

Its Structure, Sales, Costs and Profits

By JOSEPH B. MEIER
and
VIRGINIA H. McCLUNG
Washington

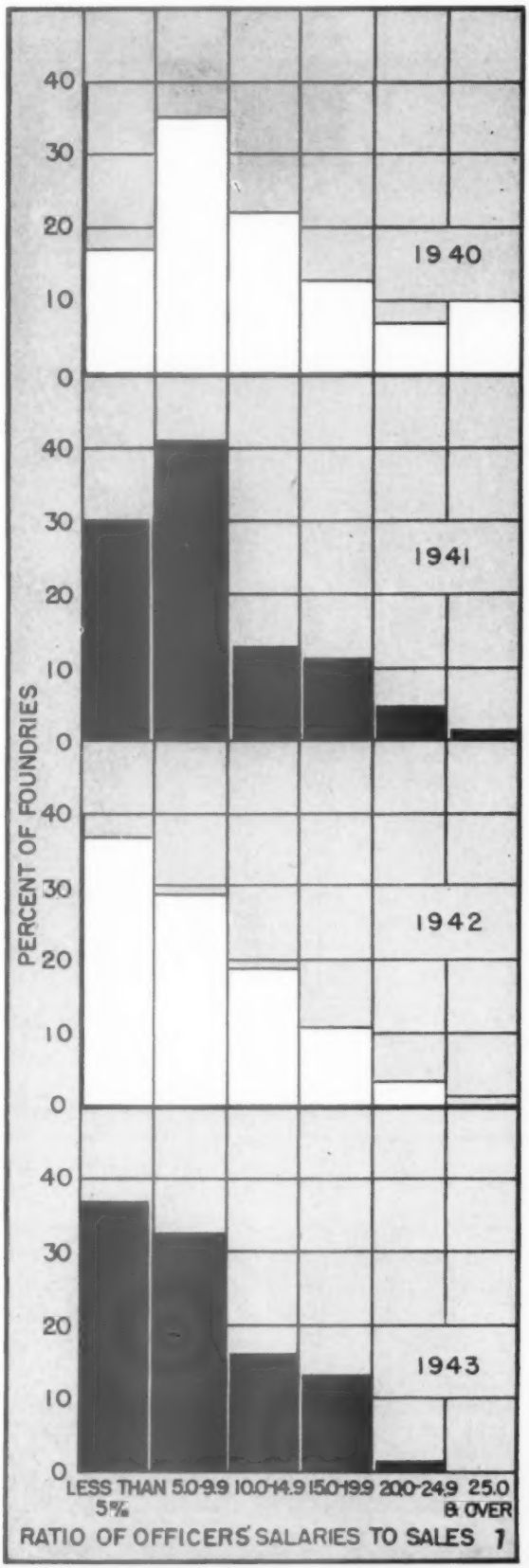
between this class of expenditure and manufacturing costs, despite the instructions on the questionnaire forms, it was found to be generally desirable to combine all costs other than metal and labor in analysis.

The policy of excluding payments to officers or owners from costs and combining them with profits was followed in order to place profit data for various companies on a comparable basis. A large number of nonferrous foundries are not incorporated. These companies usually make no charge to profit and loss for officers' salaries, handling the compensation of their officer-owners through withdrawals from the capital account instead. For such companies, a group representing at least one-third of all foundries, the net profit figure on the operating statement is one which actually represents both profits and executive salaries. Another large group of foundries are closed corporations. These companies often make payments to their officers (who are usually also their owners) which are exceedingly high in relation to the company's volume of business, in truth taking out a portion of their profits in the form of salaries, commissions, and bonuses paid to officers.

Gives Examples of Payment

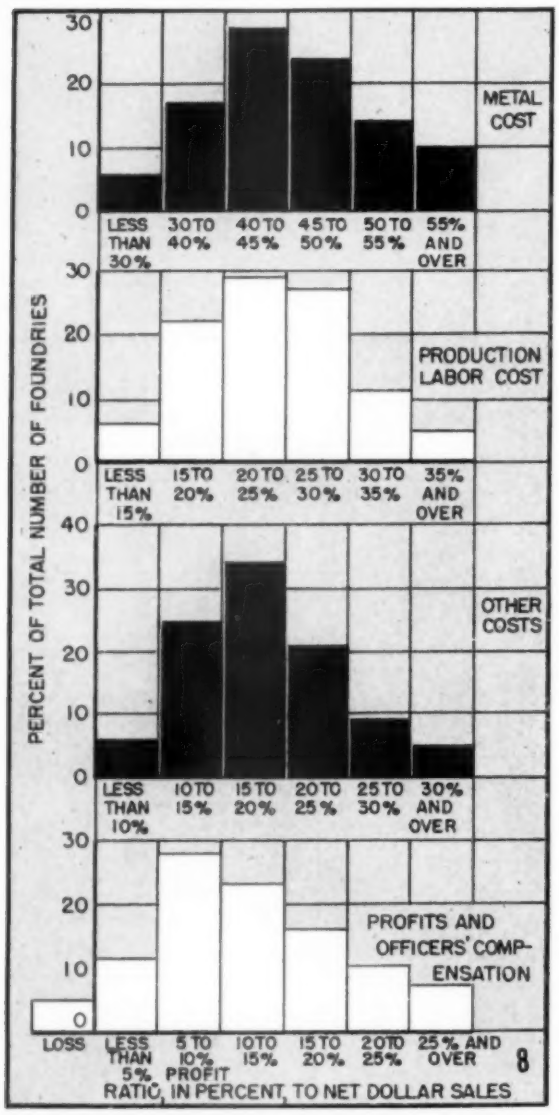
Thus, of three companies each selling $100,000 a year and showing on their operating statement net profits before taxes of $8,000, Company A has made no deduction for compensation of officers, Company B has paid out $5,000 to its officers and Company C has paid out $15,000. On the basis of the profits shown on their operating statements, all three companies have net earnings of 8 per cent on sales. Actually, however, their profit rates are 8 per cent, 13 per cent and 23 per cent respectively. This illustration is not far-fetched. In 1940, a group of brass and mixed metal foundries with annual sales of less than $100,000, paid no officers' salaries, while 5 per cent made total payments to officers of $15,000 or more. (See Table XVI).

The combination of officers' salaries with profits is also required to place profit data for different years upon a comparable basis. Over the period 1940-1943, payments to officers increased substantially. In 1940, of 68 brass and mixed metal foundries paying officers' salaries, 29 per cent paid less than $5,000 to officers and 24 per cent paid from $5,000 to $10,000. Only 7 per cent paid as much as $30,000. By 1943, salary payments had been advanced to the point that 29 per cent of the group paid $30,000 or more to company officers while another



23 per cent paid between $20,000 and $30,000. Only 8 per cent remained in the class paying less than $5000. (See Fig. 6 and Table XVII.) The increases often represented more than a necessary increase in the cost of doing business and meant that some current profits were being withdrawn by officer-owners.

Were officers' salaries a minor item of expenditure for all foundries, as for the industry's largest companies, no great error would result from failing to treat this expense uniformly. For large foundries, officers' salaries are usually under 5 per cent of total sales. For small foundries, however, they are a big item. In 1940, within a group of small foundries (companies with sales of less than $100,000) paying officers' salaries, the ratio to sales exceeded 10 per cent in more than half the cases and ran higher than 25 per cent in exceptional cases. (See Table XVIII.) With the expansion in sales that occurred in the next few years, ratios of officers' payments to sales decreased, despite the fact that dollar payments increased. They never became an insignificant item for the majority of foundries in the brass and mixed metal field, however. (See Fig. 7 and Table 19).



Officers' compensation is, of course, a legitimate cost of business. It was excluded from costs in the financial data collected from nonferrous foundries simply as a means of securing figures that would permit accurate comparisons in an industry where profits often include officers' salaries and officers's salaries often include profits. Cost figures which exclude officers' compensation understate true costs, and profit figures which include officers' compensation overstate true profits. in the case of small foundries, the understatement and overstatement are significant. "Reasonable allowances" for officers' salaries would have to be applied to the cost and profit data collected in the OPA surveys to arrive at estimates of total costs and profits before taxes. The amounts of such allowances would vary from one size of foundry to another and from one period of time to another as do the average ratios of officer payments to sales shown in Tables XVIII and XIX. They would be far below these average ratios, however, since the latter are heavily influenced by cases of abnormally high payments. The actual amounts of such allowances remain a matter of judgment. For this reason and for the reason that information on payments to officers was not collected for any period after 1943, no attempt has been made to make adjustments for officers' compensation in the financial statistics on nonferrous foundries now being released.

In the cost survey of nonferrous foundries, which covered the period 1940-1943, financial information was collected on an annual basis. In the subsequent survey—the monthly reporting program—it was collected for the first half of 1944 and for individual months thereafter, through September, 1946. The sums of monthly sales and costs over a three-months', six-months' or year's period were considered to be total sales and costs in that period and the difference between total sales and costs, as thus computed, was considered to be (*Please turn to page* 216)

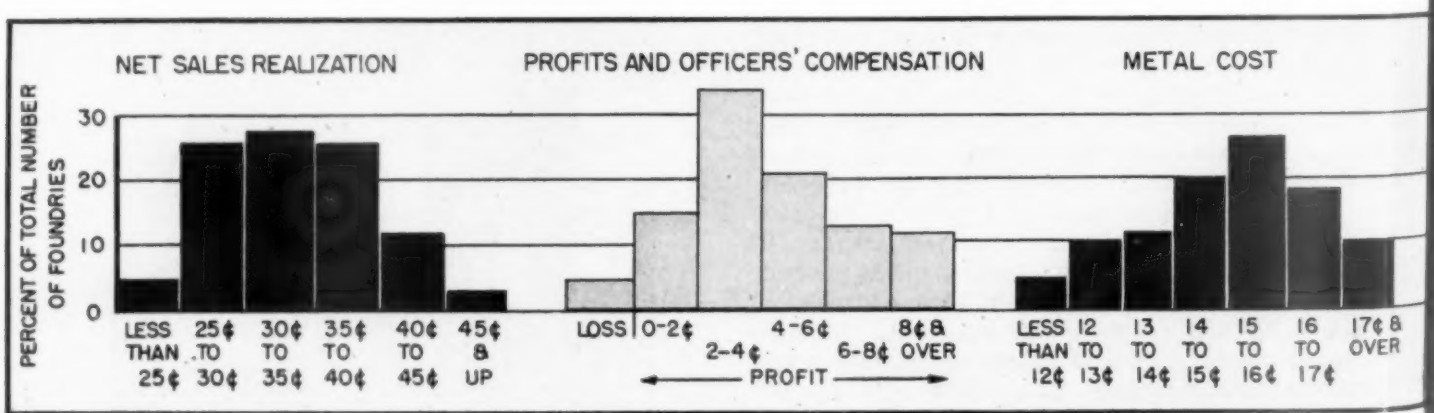


TABLE XVI—Percentage Distribution by Payments To Officers of 95 Brass And Mixed Metal Foundries, Grouped by Size, 1940

Payments to Officers	Foundries with 1940 Sales of: Less than $100,000	$100,000-$250,000	$250,000 and over	All foundries
Foundries not paying officers' salaries	39%	5%	..	29%
Foundries paying officers' salaries	61	95	100%	71
Payments to officers:				
Less than $ 5,000	29	5	..	21
$ 5,000-$10,000	15	26	10	17
$10,000-$15,000	12	16	..	12
$15,000-$20,000	5	16	20	8
$20,000-$25,000	..	16	10	4
$25,000-$30,000	..	5	30	4
$30,000 and over	..	11	30	5
Average total payment to officers	$6,800	$16,200	$24,900	$12,000

TABLE XVII—Percentage Distribution by Payments to Officers of 68 Brass and Mixed Metal Foundries Paying Officers' Salaries, Annually 1940-43

Payments to Officers	1940	1941	1942	1943
Less than $5,000	29%	22%	6%	8%
$ 5,000-$10,000	24	16	19	19
$10,000-$15,000	16	13	16	9
$15,000-$20,000	12	13	12	12
$20,000-$25,000	6	9	12	13
$25,000-$30,000	6	4	10	10
$30,000 and over	7	23	25	29
All foundries	100	100	100	100
Average payments[1]	$12,000	$19,000	$24,300	$25,000

TABLE XVIII—Percentage Distribution by Ratio of Officers' Payments to Net Dollar Sales of 68 Brass and Mixed Metal Foundries Paying Officers' Salaries Grouped by Size, 1940

Ratio of Officers Payments to Dollar Sales	Foundries With 1940 Sales of: Less than $100,000	$100,000-$250,000	$250,000 and over	All Foundries
Less than 5%	8%	17%	50%	16%
5.0- 9.0%	33	39	40	36
10.0-14.9%	25	22	10	22
15.0-19.9%	12	22	..	13
20.0-24.9%	12	..	..	7
25.0% and over	10	..	..	6
All foundries	100	100	100	100
Average ratio[1]	14%	10%	6%	12%

TABLE XIX—Percentage Distribution by Ratio of Officers' Payments to Net Dollar Sales of 69 Brass and Mixed Metal Foundries Paying Officers' Salaries, Annually 1940-43

Ratio of Officers' Payments to Dollar Sales	1940	1941	1942	1943
Less than 5%	16%	29%	37%	36%
5.0- 9.9%	36	42	30	33
10.0-14.9%	22	13	19	16
15.0-19.9%	13	11	10	13
20.0-24.9%	7	4	3	2
25.0% and over	6	1	1	
All foundries	100	100	100	100
Average Ratio[1]	12%	9%	8%	8%

[1] Averages cover only those foundries paying officers' salaries. They represent the total payment to officers, whether one or more in a company. Source: OPA Form 677-668.

TABLE XX—Average Operating Ratios of Samples of Nonferrous Foundries of Principal Metal Specialty Classes, 1944

Item	Brass Foundries: Specialized Foundries[1, 2]	Brass Foundries: Other Brass Foundries: Single-line	Brass Foundries: Other Brass Foundries: Multiple-line	Mixed Metal Foundries	Aluminum Foundries[2]	Magnesium Foundries[2]
Costs and Profits per Pound of Castings Sold						
Net sales realization	25.5c	33.9c	35.2c	50.7c	82.0c	215.2c
Metal cost (including metal loss)	13.1	14.9	15.2	15.1	15.7	30.5
Production labor cost[3]	3.2	8.2	8.9	15.0	27.3	72.5
Other manufacturing costs[3]	3.6	4.5	5.8	7.5	15.4	69.4
Total manufacturing costs[3]	19.9	27.6	29.9	37.6	58.4	172.4
All other expenses[3]	2.1	1.9	2.9	2.6	9.1	13.5
Total costs[3] per lb	22.0c	29.5c	32.8c	40.2c	67.5c	185.9c
Profits and officers' compensation	3.5	4.4	2.4	10.5	14.5	29.3
Costs and Profits in Ratio to Net Dollar Sales						
Net sales realization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Metal cost (including metal loss)	53.4	45.1	44.3	31.8	20.6	14.5
Production labor cost[3]	12.9	23.8	25.2	28.9	32.5	33.9
Other manufacturing costs[3]	11.9	12.4	15.2	13.5	18.1	31.7
Total manufacturing costs[3]	78.2	81.3	84.7	74.2	71.2	80.1
All other expenses[3]	9.1	6.1	8.6	6.2	10.5	5.8
Total costs[3]	87.3%	87.4%	93.3%	80.4%	81.7%	85.9%
Profits and officers' compensation	12.7	12.6	6.7	19.6	18.3	14.1
Number of foundries	7	94	21	24	27	8

[1] Makers of railway journal bearings or ship propellers. These two classes are combined because too few companies are covered to warrant the release of averages for each class separately.
[2] Includes some multiple-line producers. These companies reported only costs applicable to sales of rough nonferrous castings.
[3] Excludes any payments to officers or owners. Source: OPA Form 677-668, 677-2151 and 2152.

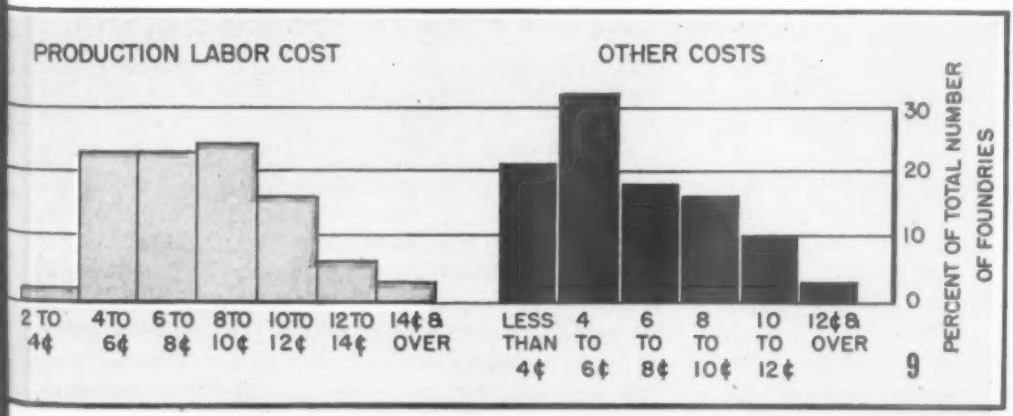


Fig. 8—Distribution of 94 brass foundries according to ratios of costs and profits to net dollar sales in 1944

Fig. 9—Distribution of 94 brass foundries according to per pound costs and profits in 1944

Questions and Answers

Using Mold Sand for Cores

Q.—We operate a foundry in Holland, and have seen references to the use of cores made from molding sand such as those employed in molding machine operation in production of gray iron castings. Can you give us any information on how that is accomplished?

A.—Presumably your reference to making cores of molding sand means those which are dried or baked rather than "green" sand cores which are employed in the moist state. As you know, molding sand does not possess sufficient bond to permit it to be baked and handled after that operation since it is extremely friable. Hence, some additional bond is employed and the materials usually used include cereal binders such as corn flour, dextrine, clay, dry sulphite or lignin, rosin, pitch, etc.

Such cores cannot be used for all purposes, especially where the core has to be removed through a small opening as the clay present sometimes prevents suitable collapsibility. You will have to experiment to determine the most suitable binder or combination of binders, and the amount to be added to give satisfactory cores. Usually the amount of binder (rosin, pitch, dry sulphite, etc.) is around 2 per cent.

Special Rolls for Sugar Mill

Q.—We shall appreciate information on the foundry practice involved in the production of 800 lb chill-cast sugar mill rolls with a 2-in., steel shaft in the center. Our cupola is lined to 32 in., inside diameter. Is it necessary to melt car wheel scrap for these castings? If not, what is a suitable composition?

A.—Chilled roll making is a highly specialized branch of of the foundry industry. Commenting on this subject, the late Dr. Moldenke in *Principles of Iron Founding* states: "Chilled rolls is a special study. In fact it may be said the successful production of chilled rolls, as representing heavy lines of castings, and automobile cylinders for the light, means the holding of the highest degree, *summa cum laude*, conferred by the foundry industry upon its ablest students." Probably half a dozen foundries in this country make all the rolls required. No outside jobbing shop can approach them in efficiency of method, operation, metal composition, or life of the product. Various phases of roll making have been described on many occasions in THE FOUNDRY.

An exceptionally complete article describing the manufacture of chilled cast iron rolls in a prominent midwest foundry, was presented in the July, 1935 edition. Roll making always was and now is more particular than ever since alloys came into use. However, it may be that the rolls you have in mind are simple feeder rolls and therefore need not show exceptional physical properties. In that case all that is needed is an iron that will take a certain depth of chill. Approximate composition, with variation to suit the required depth of chill, will show TC 3.25 per cent; Si 0.75 per cent; S 0.06 per cent; P 0.40 per cent; Mn 0.80 per cent. Without further detail on the diameter and length of the roll, it is impossible to suggest the thickness and construction of the chill. In some instances the chill may be a plain cylinder in one or more sections. In other instances the chill may be split vertically on a center line and joined by a male and female joint.

Ladle Additions Supply Chill

Q.—We would like to chill some gray iron castings without using a metal chill. Is there any chemical or other material which we could use? If so where can we obtain it and how is it used?

A.—Cast iron which ordinarily would produce castings with a gray fracture can be modified by ladle additions of strong carbide stabilizers so as to provide white fracture or chilled castings. One of the elements used for that purpose is chromium while another is tellurium. Of the two, the latter is much more powerful in its action. Tellurium also may be applied as a wash on sections of the mold or core face to limit its effect to certain areas similar to employing chills for the purpose.

If chromium is employed, use the special foundry grade of ferrochromium containing about 65 per cent chromium; crushed 20 mesh and down. Without knowledge as to the present composition of your iron and the results desired in the final castings, no suggestions can be made as to the amount of ferrochromium to be added to the ladle. If those data are included when you write to the producer of ferrochromium, he can supply the information.

Tellurium is available in the form of slabs, sticks, powder and pills. For ladle additions such as you might use, the pill form probably is preferable, and the powder form for use in washes. We understand that the latter application is patented. As previously mentioned, without the proper information no recommendations as to quantities and procedure can be made. However, it might be pointed out that as little as 2 grams of tellurium per ton of iron will have a decided effect on the structure.

Break Pigs for Small Cupola

Q.—We require some form of mechanical device for breaking the pig iron going into our two 8000-lb cupolas. We do not find any device of this kind mentioned in the advertising pages of THE FOUNDRY. We shall appreciate any information on the names and addresses of companies engaged in the manufacture of pig breaking equipment.

A.—So far as we know there is no firm in the United States engaged in the production of a mechanical device for breaking pig iron. It is not necessary to break the pigs going into a large cupola. The quantity going into a small cupola can be broken by a workman armed with a sledge hammer. Where it becomes necessary to

break large pieces of scrap or large scrap castings, a drop ball usually is employed. The ball, varying in weight from ½ to 5 tons, depending on the required service, is lifted by a steam, electric or air hoist. In some instances a yardcrane, is utilized. At the peak of the lift, the catch on the ball is released automatically, or by a jerk on a trip rope in the hands of a workman in the vicinity.

Equipment and installation of all these devices are made in the shops of the company which intends to use them, or by local jobbing shops. Several foundries engaged in the production of chilled cast iron car wheels, employ a tup type device for breaking the scrap wheels returned by the railroads and destined for remelting in the cupola. The idea may have been suggested by the tup or drop weight employed for testing wheels. As part of the testing process a selected number of wheels from each batch are placed in turn on a three point anvil where they are subjected to the impact of a falling weight a definite number of times. The same type of machine is employed for breaking the scrap wheels. In the breaker the tup is much heavier than in the testing machine. One blow breaks the wheel into several pieces small enough to be incorporated in the charging cars which serve the cupola.

Method for Locating Porosity

Q.—We are pouring various sizes of bushing stock in our brass foundry which is sold subject to replacement if defective. Is there any method beside x-ray examination by which we could detect porosity before shipment?

A.—Two possibilities for determining porosity in the bushings are pressure testing and use of black light or infra-red rays—but we believe their successful application will require two conditions. In the case of pressure testing the castings will have to be hollow and preferably machined inside and out since sometimes the casting skin will hold the pressure. Use of black light or infra-red rays involves use of an oil with fluorescent properties into which the casting is immersed, drained and washed with water. The fluorescent oil remains in the porous sections and when examined under black light shows up quite distinctly. Use of that process again involves reasonably smooth surfaces or those which have been machined.

Aluminum Alloy Castings Crack

Q.—We desire to know just what type of aluminum alloy is best suited for slipper box material to be used in our gray iron plant. We have made up a few of these from regular crankcase aluminum, but find that the metal is not altogether suited for this type of work. They crack too easily, due to the heat perhaps. They seemed all right at first, but as we have gone along, they have been inclined to crystallize and break very readily.

A.—Presumably the aluminum crankcase alloy you have been using is the 8 per cent copper—92 per cent aluminum type or one of the later variations containing 1 per cent iron and 2 per cent zinc. These alloys are less resistant to shock than the 5 per cent silicon—95 per cent aluminum or the 4 per cent copper—3 per cent silicon—83 per cent aluminum alloys, and there is no doubt that the slip jackets, or slipper boxes as you call them, receive considerable punishment in use. However, we believe that some of your trouble may arise from your molding and melting practices. Aluminum alloys are somewhat hot short, and unless the molding sands and molding practice are such as to provide collapsibility, fine tears or cracks may be present which later result in breakage. Perhaps a heat treatment at 450-500° F for 2 or 3 hours might relieve any internal stresses and give better results.

Possibly you are melting and pouring the metal at too high a temperature which will result in coarse grain structure of low physical properties. Aluminum alloys should not be heated to more than 100° F and preferably 50° F above the desired pouring temperature, and the latter should be established by experiment as that at which sound castings without cold shuts are obtained.

How To Keep Coreboxes Clean

Q.—Can you recommend any material for cleaning coreboxes, both wood and metal, and also how can you prevent sand from sticking in the coreboxes?

A.—Both wood and metal coreboxes can be kept clean by wiping or brushing with kerosene after use. Be sure to get into all pockets and crevices. That practice is even worthwhile during short work stoppages and from time to time during use to prevent any possibility of stickdowns. However, if the coreboxes have been allowed to stand without cleaning for a sufficient time for the oil to oxidize or harden, then cleaning becomes a difficult job—the longer the hardening period, the more difficult to remove.

With wood coreboxes in that condition, the dried and hardened material will have to be softened with kerosene and then rubbed off. In some cases it may be necessary to scrape the deposit off, and then care must be taken to see that the original profile of the box is not damaged. Sometimes it may be necessary to use paint and varnish remover to soften the deposits. That material

GANGWAY! By J. A. PATTERSON

"Slobkotsky, do you have to eat them terrible, terrible smellin' fish every day?"

also will remove the coating on the box and it will have to be refinished.

Cast iron coreboxes can be cleaned by soaking in kerosene as in the case of wood boxes, but for faster action they can be cleaned with a strong caustic soda solution or with strong solution of sodium silicate or metasilicate. Strongly alkaline solutions are corrosive to aluminum so they must be diluted considerably. Hence, a solution of one part of liquid sodium silicate to 30 parts of water should be used.

Sand may stick in the coreboxes for a number of reasons. Some core binders are tacky or sticky, and in these cases the addition of a little fuel oil will stop the trouble. Usually the trouble is due to a high moisture content, and we suggest that you start there.

Forms Background for Tablet

Q.—Please advise us how we can obtain the rough background effect when making wood patterns for bronze tablets.

A.—Presumably by the rough background effect on tablet castings you are referring to what may be described as a pebbled appearance, and that is obtained through use of bookbinders cloth employed in making covers for books. One type of that material is designated N24½ extra Interlaken Mills cloth, and in general it is a fabric more commonly known as imitation leather. The cloth is attached to the pattern board or plate by gluing or other means, and then the desired letters, etc. are fastened in place. Similarly other types of fabrics can be used for forming backgrounds. However, after fastening down the material would have to be treated with thin shellac, lacquer, etc., so as to provide the necessary waterproofing and protection of the fibers.

Casting Pitted on Cope Side

Q.—We are sending you two red brass castings made of 85-5-5-5 alloy which, as you will notice, show discolored surfaces as well as pitting on the cope side. Castings are sound but the customer is dissatisfied, and we would like to know what causes that appearance. They are made along with six others of similar design and shape. Parts are molded loose and a gate is cut by hand. Sand is No. 1 Albany cut over by hand. Castings are poured at 2150°F from crucibles heated in natural draft coke furnaces.

A.—The rough and somewhat discolored surfaces of the castings show the presence of considerable sand in the depressed areas, and your problem is one of determining where it comes from. We have an idea that it results from the practice of cutting the gates by hand—or rather from carelessness in that procedure. In cutting gates by hand the sand in the vicinity is disturbed and loosened, and unless the operator presses or densens the sand by use of his hand, it is subject to washing and erosion by the flowing metal stream. The loose sand is carried ahead of the metal into the casting cavity. At that point it floats upward and lodges against the cope, although sometimes it is caught and held on the sidewalls.

In some cases such sand is distributed into all the casting cavities due to the arrangement of the gating system, while in others the loose sand is carried to the end of the runner and into the casting cavities at that point. Hence, many foundrymen find it an excellent practice to extend the runner a short distance beyond the last gate openings to form a blind pocket. The metal flows along to the pocket and then backs up, leaving any dirt or dross in the pocket. Therefore, we suggest that you look into the gate cutting practice now employed, applying remedial measures, and as added insurance extend the runner to a point beyond the last branch gates.

Castings Are Not Fed Properly

Q.—We are sending for your consideration a small section of a flange taken from a rejected cast iron valve. You will note the discolored open fracture appearing in the center of the piece at the joint line of cope and drag sections. Neck of the valve body is adjacent to the flange and about half the thickness of the flange.

A.—Examination of the section of flange and study under a low power magnifying glass indicates that the open structure is the result of improper feed, and presumably the discoloration resulted from the penetration of some moisture during a pressure test. While no mention is made of the method of gating and risering, you probably gated into both flanges from a single runner and placed risers at the top of the flanges. While that theoretically should give solid castings, we suspect that the runner or gate froze off before the casting solidified. Hence, the remedy is to open either or both so that they freeze after the casting. Also we believe that instead of placing risers on top of the flanges you will obtain better results by locating them between runner and casting, and as close to the casting as possible.

By locating the risers in that position they are filled with hot metal when pouring ceases, and function in their intended purpose to supply fluid metal to the casting as it solidifies from the exterior to the center. Connection between risers and casting should be sufficiently large so that no freezing off occurs, otherwise the risers may as well be left off.

Metal Penetrates Jacket Core

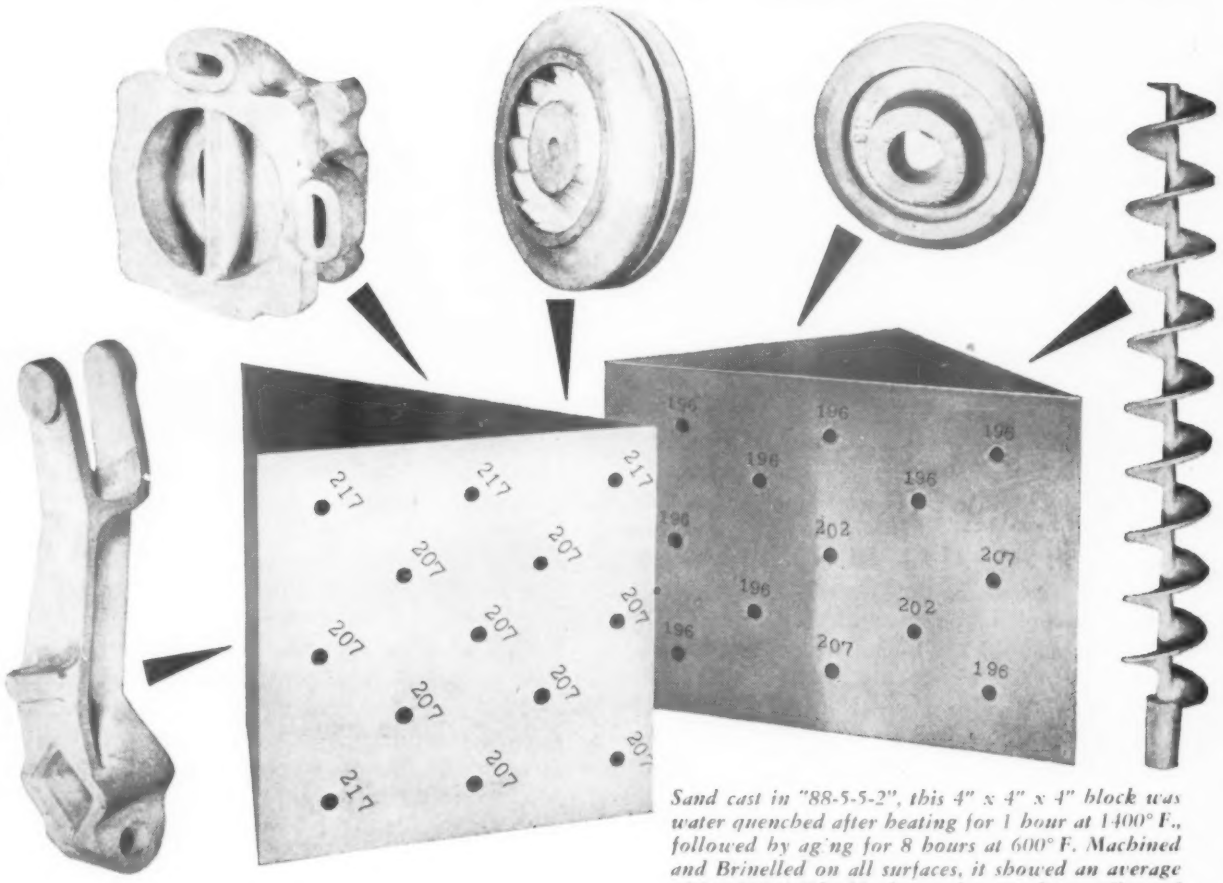
Q.—We shall appreciate your advice on a suitable sand mixture for the small outlet cores on a bronze water jacket. The core is ½-in. thick, 7-in. diameter with three ½-in. outlets on the cope and two ½-in. outlets on the drag side. At present the metal penetrates the small cores on the bottom. The casting weighs 75 lb.

A.—Either one of two methods may be employed to prevent the metal from eating into the small outlet projections on the lower side of the jacket core. In the first the small projecting parts of the core are made from your regular core sand mixture containing a 2 per cent addition of iron oxide. These parts of the core then are dipped or painted with a silica wash, silica flour mixed to a creamy consistency with molasses water, or any other water soluble binder, and thoroughly dried. In the second method the little members are pieces of 3/8-in. steel tubing, or pieces of solid 3/8-in. steel rod, depending on whether you take a vent through the bottom cores or take all the vent through the cope openings. The steel tube or rod is dipped in core oil and then rolled in fine silica sand. As in the first instance these parts of the core are dipped in or painted with silica wash.

AN AGE-HARDENABLE

NICKEL-BRONZE

DEVELOPED FOR HEAVY DUTY SERVICE



Sand cast in "88-5-5-2", this 4" x 4" x 4" block was water quenched after heating for 1 hour at 1400° F., followed by aging for 8 hours at 600° F. Machined and Brinelled on all surfaces, it showed an average of 209 BHN. The block was then cut diagonally, and both interior surfaces averaged 197 BHN.

Specify "88-5-5-2" (Copper-Tin-Nickel-Zinc) where you want corrosion-resistant bronze castings with extremely high mechanical properties.

This alloy in the "as-cast" condition serves the same purposes as "G" Bronze, but that's not the whole story.

The excellent physical properties of "88-5-5-2" may be immensely improved by heat treating . . . as exemplified by the block shown above.

The Nickel content provides the age-hardening response which increases both tensile and compressive strength, being particularly effective in raising the elastic properties. Nickel also increases fluidity in the casting mixture, thus affording a widened casting range that helps to minimize misruns and improves density and pressure-tightness.

This age-hardening Nickel-bronze meets wide demands. Philadelphia Bronze and Brass Corp., maker of the parts illustrated, produces "88-5-5-2" castings that range in size from ½" x 12" bars to parts weighing over 500 pounds.

EMBLEM OF INCO SERVICE
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes and other alloys containing Nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

Foundry Educational Foundation Program

STARTS AT FIVE UNIVERSITIES

THE FOUNDRY Educational Foundation is making excellent progress in its fund raising campaign, and has formally inaugurated its program of engineering training, according to a recent announcement by Anthony Haswell, president of the organization. On Aug. 20, over 383 firms had pledged $201,018.50 in support of this educational project.

As a result of action taken by the trustees of the foundation at the regular quarterly meeting held Aug. 14 at Dayton, O., checks covering scholarships costs for the first year and other funds being provided the universities by the foundation have been forwarded to the five institutions participating in the educational program. These payments are taken from money raised among contributing members of the foundation. While the campaign for funds will carry on until the goal required for the three-year training program has been reached, the whole-hearted response of the foundry industry and the equipment and supply industries to this movement has justified the beginning of the program without further delay.

The Foundry Educational Foundation has opened an office at 1004 Public Square Building, Cleveland 13. The telephone number is Superior 4524.

The men who will guide this program in each of these universities, along with a brief biography of each, are presented in this article. Their whole-hearted efforts in developing a proper curriculum and in making arrangements for the installation of equipment and other facilities which will permit the training of engineers for the foundry industry, have been strongly reinforced by the co-operation of President T. Keith Glennan, Case Institute of Technology; Dean C. Albert Joerger, University of Cincinnati; Dean S. C. Hollister, Cornell University; Dean Thomas K. Sherwood, Massachusetts Institute of Technology; and Dean M. O. Withey, University of Wisconsin.

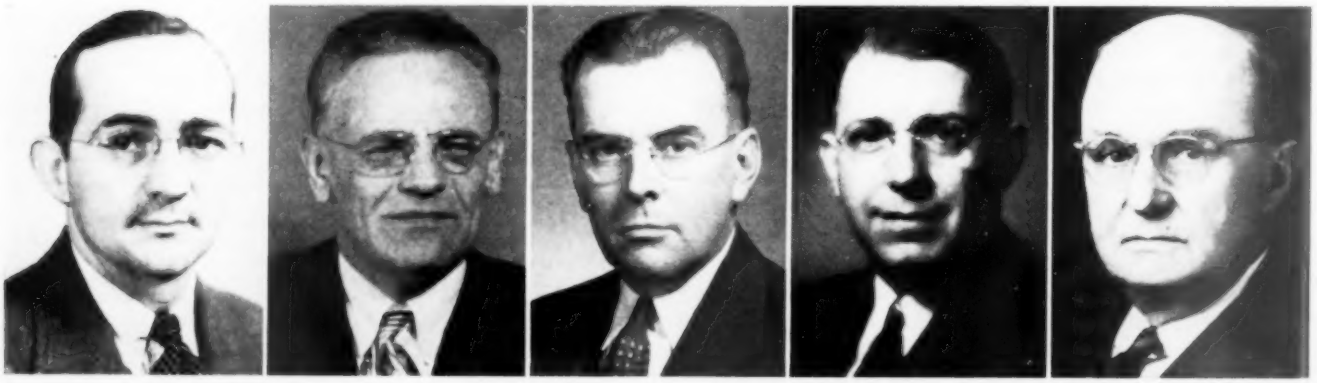
Other members of the college faculties have been closely associated with the details of the program, including Prof. Fred H. Rhodes, director of the Department of Chemical and Metallurgical Engineering, Cornell University, and Prof. John Chipman and Prof. John Wulff, Massachusetts Institute of Technology, who have given their excellent support in the introduction of the foundry curriculum in their respective universities.

Each of the five universities which will participate in the program of the Foundry Educational Foundation have educators on the faculty who are well qualified by past experience to teach the various subjects required in the training of the foundry engineer. It is not possible at this time to identify all of the men who will have a part in this work.

The following faculty members will be most intimately associated with this training program in the immediate future: At Case Institute of Technology, Prof. K. H. Donaldson will have Merton T. Bowley, formerly production metallurgist at Westinghouse Electric Corp., as instructor in metallurgy, and Edward J. R. Hudec as instructor in foundry engineering in the Department of Mechanical Engineering. At the University of Cincinnati, Prof. R. S. Tour will have Prof. Roy O. McDuffie for instruction in physical metallurgy and Prof. John F. Kahles for mechanical engineering. At Cornell, Prof. Peter E. Kyle will have Associate Prof. Malcolm S. Burton for instruction in metallurgy and in addition will have instructors in the foundry laboratory.

As Massachusetts Institute (*Please turn to page* 152)

Educators Guiding Foundry Engineering Training

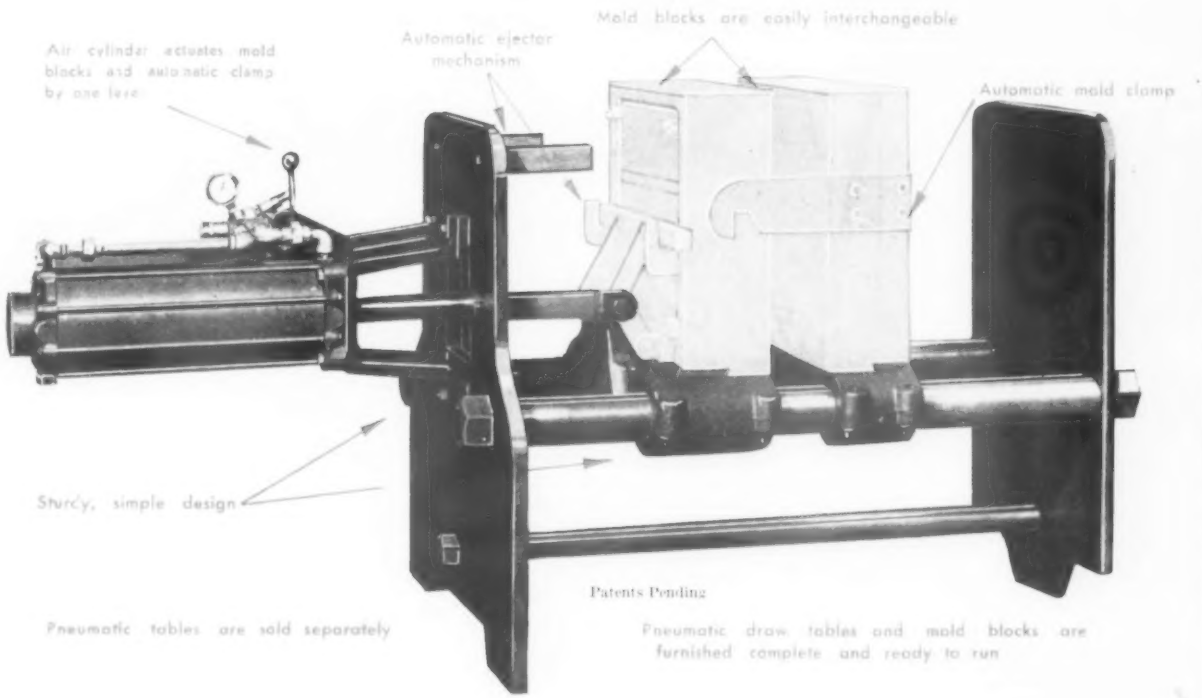


HOWARD F. TAYLOR, *MIT* | REUBEN S. TOUR, *Cincinnati* | PETER E. KYLE, *Cornell* | GEORGE J. BARKER, *Wisconsin* | KENNETH H. DONALDSON, *Case*

Keep in Step with the Latest Trend in

PERMANENT MOLDS

FOR ALUMINUM CASTINGS


Mold blocks are easily interchangeable
Automatic ejector mechanism
Air cylinder actuates mold blocks and automatic clamp by one lever
Automatic mold clamp
Sturdy, simple design
Patents Pending
Pneumatic tables are sold separately
Pneumatic draw tables and mold blocks are furnished complete and ready to run

● Permanent molds of the manually operated type give you increased production, improved casting quality, smoother and more attractive castings, closer dimensional tolerances, saves money on production parts and requires less polishing and machining.

Air operated molds save additional time and money. Mold cavity blocks accommodating castings up to 10″ in size are easily interchangeable. Larger tables and mold cavity blocks are also available. The simple and durable design enables ease of operation and requires very little upkeep. In addition, this time and effort saving pneumatic table permits constant use. Inquire now for future production requirements.

It is of utmost importance to have your mold blocks for both manually operated and air operated molds accurately and properly designed to suit the requirements of your foundry and to enable them to produce aluminum castings with a minimum amount of effort. Expenses incurred in the initial cost of this type of *PROVEN AND DEPENDABLE* mold equipment is quickly amortized in more efficient production.

Send us your blueprints or sample castings for quotation.
Your inquiry will receive our immediate attention.

MASTER PATTERN COMPANY

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DESIGNERS AND MANUFACTURERS OF PERMANENT MOLDS, WOOD AND METAL PATTERNS AND MODELS

MEN of Industry

CHARLES F. BUNTING, elected chairman of the Canton District Chapter of the American Foundrymen's Association for the year 1947-48, is metallurgist, Pitcairn Co., Barberton, O. Mr. Bunting attended the University of Chicago and, following Navy service in World War I, he was appointed assistant chemist, Danville Malleable Iron Co., Danville, Ill., in 1920. In 1933 he was appointed melting foreman at Decatur Malleable Iron Co., Decatur, Ill., where he remained until 1935, when he became metallurgist at Southern Malleable Iron Co., East St. Louis, Ill. In 1937 he joined Dayton Malleable Iron Co., as metallurgist at its Ironton, O., plant, and the following year was made superintendent of Midwest Castings Co., at Middletown, O. Since 1939 he has been metallurgist with the Pittsburgh Valve & Fittings Division, Pitcairn Co. Mr. Bunting is a charter member of the Canton District Chapter and served as its vice chairman last year.

♦ ♦ ♦

S. J. Moran, formerly assistant treasurer and production manager, Union Steel Castings Division of Blaw-Knox Co., Pittsburgh, has been advanced to works manager. Mr. Moran attended night school at Duquesne University. He started at Union Steel Castings as an office boy and has served on nearly every job in the shop and office. **J. L. Daugherty** succeeds Mr. Moran as assistant treasurer and production manager. Mr. Daugherty was graduated from Grove City College and was associated with an accounting company before joining Blaw-Knox in 1941. He served as an accountant with the parent company and then became division auditor at Union Steel Castings.

♦ ♦ ♦

John T. Clausen, recently elected chairman of the Northern Illinois and Southern Wisconsin Chapter of the AFA, is foundry engineer, Greenlee Bros. & Co., Rockford, Ill. Following graduation from Los Angeles High School and a postgraduate course at Los Angeles Polytechnic High School, Mr. Clausen worked in the testing, engineering and foundry departments at Stover Mfg. & Engine Co., Freeport, Ill. Three years later he entered University of Illinois, where he received a degree in mechanical engineering. He returned to Stover Mfg. & Engine Co. in 1924, in the engineering department, later taking charge of metallurgical work and the automotive foundry division. He became associated with Greenlee Bros. & Co. in 1935, handling engineering problems in the machine tool and light production foundries. Mr. Clausen served as chairman of the Northern Illinois and Southern Wisconsin Chapter in 1938-39, was chairman of its membership committee when it won third place in the national membership contest and was vice chairman of the chapter last year.

S. E. Langenberg is owner of a new production gray iron foundry to be known as Cadillac Foundry Co., which he designed and built at Cadillac, Mich. Until a year ago Mr. Langenberg was foundry engineer, Western Foundry Co., Chicago. He studied mechanical drafting at Chicago Technical College and became a machinist apprentice at Acme Motor Truck Co., Cadillac, Mich. He spent four years as patternmaker and pattern foreman at Cadillac Malleable Iron Co., a year at International Harvester Co., Chicago, and from 1930-1936 was pattern foreman at National Malleable & Steel Castings Co., Cicero, Ill., until he joined American Steel Foundries, Granite City, Ill., as a special engineer on cast armor plate in 1942.

♦ ♦ ♦

Paul G. Lutz, vice president and general manager, Standard Alloy Co. Inc., Cleveland, has been elected president of the Alloy Casting Institute. Other officers elected include: **W. B. Sullivan,** Lebanon Steel Foundry Co., Lebanon, Pa., vice president; and **E. A. Schoefer,** Alloy Casting Institute, executive secretary and treasurer. **H. A. Cooper,** president, the Cooper Alloy Foundry Co., Hillside, N. J., and **J. D. Corfield,** vice president, Michigan Steel Castings Co., Detroit, have been elected to the board of directors for three-year terms. **H. S. Avery,** research metallurgist, American Brake Shoe Co., New York, has been elected technical research committee chairman.

♦ ♦ ♦

Joseph M. Weldon has been appointed assistant to the vice president, the International Nickel Co. Inc., New York. Mr. Weldon attended Columbia University and became an assistant metallurgist with the research laboratory of Union Carbide & Carbon Corp., at Long Island City, in 1926. He joined International Nickel in 1927 in the nickel alloys sales department. He has been head of the

(*Continued on page* 106)

CHARLES F. BUNTING

J. L. DOUGHERTY

S. J. MORAN

JOHN T. CLAUSEN

Looking to the future

Quantity — not quality — is the uppermost concern of merchant iron users today. In this unprecedented period of all-time peak demand, no merchant iron producer in the Nation — including Woodward — is able to keep pace with customers' requirements for prodigious quantities of iron.

But if the history of the iron industry, which we have shared for 64 years, is a sound guidepost for the future, we can be sure that today's abnormal situation will not last. Once again, as in the past, *quality* — not quantity — will be the buyers' prime consideration.

Today at Woodward, we are straining every resource to meet customers' demands to the fullest possible extent. But looking to the future we are also maintaining those rigid standards that have made Woodward iron nationally known for *consistent, uniform quality* under all conditions of the iron market.

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WOODWARD, ALABAMA

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1515 First National Building
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(*Continued from page 104*)

aeronautical division of that department since his return from Navy service in 1945. During World War II Mr. Weldon was a captain in the Naval Reserve and was administrator of the aircraft scheduling unit at Wright Field, Dayton, O. In his new assignment he will be assistant to H. J. French, a vice president of International Nickel Co.

♦ ♦ ♦

Henry E. Russill, president of the Southern California Chapter of the American Foundrymen's Association for the year 1947-48, is vice president of Eld Metal Co. Ltd., Los Angeles. Mr. Russill entered the foundry industry in 1936, at the suggestion of his father-in-law, A. R. Layer, president of Eld Metal. He began in the cleaning room and later gained experience in the various other departments of the Eld plant. Subsequently he was made vice president of the company. Prior to his association with the industry he was in the wholesale drug business in Los Angeles, his native city, and later was in the traffic department of Los Angeles county. Mr. Russill became associated with American Foundrymen's Association in 1941 and was elected secretary of the Southern California Chapter in 1944, serving for two years. He served as vice president of the organization last year.

♦ ♦ ♦

William C. Adler and **Peter D. Humont** have been appointed foundry service engineers, Eastern Clay Products Inc., Jackson, O., where they will be engaged principally in application of chemically coated sand. Mr. Adler was graduated from University of Cincinnati and has been associated with Ohio Steel Foundry Co., Lima, O., for 18 years. He has worked in the engineering, molding and metallurgical divisions and has been in charge of sand for the past 6 years. He is a member and past director of the Toledo Chapter of the AFA. Mr. Humont, a graduate of Western Michigan College, entered the foundry industry at the Harmon Foundry Co., Waterloo, Iowa. In 1943 he became assistant superintendent and a year later joined John Deere Tractor Co., Waterloo, where he has been sand control supervisor for the last 3 years. Mr. Humont is a member of the Northern Iowa Foundrymen's Association.

♦ ♦ ♦

Douglas J. Strong, recently elected chairman of the Central Michigan Chapter of the American Foundrymen's Association, is president of Foundries Materials Co., Coldwater, Mich. Mr. Strong served an apprenticeship in the Homer Furnace & Foundry Corp., Coldwater, founded by his grandfather, Samuel D. Strong, and with which his father, also a foundryman, is still actively associated. He was attending Cass Technical Institute of Metallurgy when he entered military service and upon his return resumed metallurgical study at Wayne University, Detroit. Last year he acquired the Foundries Materials Co., following the death of Luther Curl, who formerly owned and operated the business. When the Central Michigan Chapter was organized this year Mr. Strong was chosen its first chairman.

♦ ♦ ♦

John D. Jones, formerly chief industrial engineer, Hamilton Foundry & Machine Co., Hamilton, O., has been named staff industrial engineer, Blaw-Knox Co., Pittsburgh. Previous to his work at Hamilton Foundry, Mr. Jones was assistant to the superintendent of foundries, Edgar Thompson Works, Carnegie-Illinois Steel Corp., Braddock, Pa. He obtained his bachelor of science degree in industrial engineering from the University of Pittsburgh in 1938.

♦ ♦ ♦

Charles J. Hardy Jr., formerly executive vice president, has been elected president of the American Car & Foundry Co., New York. Mr. Hardy succeeds **F. A. Stevenson** who recently resigned after having been connected with the company for over forty years. **Rudolph Furrer** has been appointed vice president in charge of engineering and research for the American Car & Foundry Co., succeeding **Edmund Dana Campbell,** who recently retired after being connected with the company since 1904.

♦ ♦ ♦

Allan B. Kime has been appointed eastern regional manager, Ransome Machinery Co., subsidiary of Worthington Pump & Machinery Corp., Harrison, N. J., in charge of the sale of positioning and turning roll equipment at the Ransome plant, Dunnellen, N. J. Mr. Kime, an electrical engineer, has been associated with Federal Shipbuilding & Drydock Co., Kearny, N. J., for the last 12 years, in charge of welding production methods and procedures.

♦ ♦ ♦

A. G. Peterson, vice president, Corn Products Sales Co., has transferred his headquarters from Philadelphia to 17 Battery Place, New York. Mr. Peterson is eastern division general sales manager, Corn Products Refining Co., in charge of the Philadelphia, Baltimore, Pittsburgh, Syracuse and Buffalo sales offices. Mr. Peterson will also direct bulk and package sales in metropolitan New York and New England.

♦ ♦ ♦

W. F. Rochow has been appointed assistant to the president, Harbison-Walker Refractories Co., Pittsburgh. Mr. Rochow will be in charge of the research and sales technical departments, his work since he joined the company in 1912 having been in these branches of the business.

♦ ♦ ♦

Desmond Gamble, formerly office manager, has been appointed sales representative of McNally Pittsburg Foundries Inc., Pittsburg, Kans., in charge of gray iron casting sales in the western half of the country. Through its parent com-

(*Continued on page 110*)

HENRY E. RUSSILL

PETER D. HUMONT

WILLIAM C. ADLER

DOUGLAS J. STRONG

YOUR DUST PROBLEM CAN BE SOLVED BY SLY

Economically Promptly Conveniently

SLY ENGINEERS give you the answer for your conditions. Call a Sly engineer today.

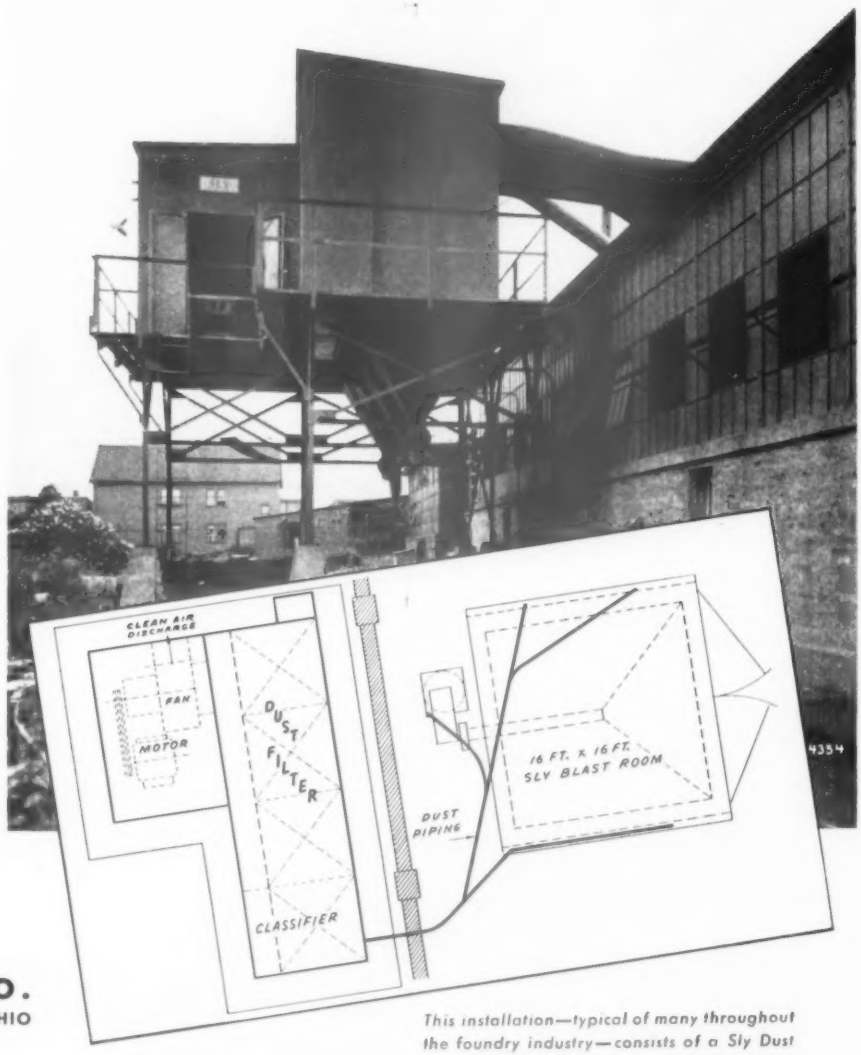
He will cooperate with your staff in a study of all the factors vital to a successful dust control installation—plant layout—operating conditions—hoods—piping—ventilation—and the Sly Dust Filter to serve you best.

FOUNDRYMEN REALIZE 5 EXCLUSIVE ADVANTAGES IN SLY DUST FILTERS:

1. Greater filtering capacity because of more filtering cloth.
2. Taut bags (patented) save power and improve dust removal.
3. Bags more easily replaced.
4. Automatic control (any degree) minimizes or entirely removes the human factor.
5. Simpler shaker mechanism results in savings in maintenance and operation.

Ask for Bulletin 98 and tell us your problem so that we can write you fully.

THE W. W. SLY MFG. CO.
4753 TRAIN AVENUE CLEVELAND 2, OHIO



This installation—typical of many throughout the foundry industry—consists of a Sly Dust Filter exhausting a large Sly Blast Room.

SLY INDUSTRIAL DUST CONTROL

TUMBLING MILLS BLAST CLEANING EQUIPMENT

Wheelabrator Speeds Pro

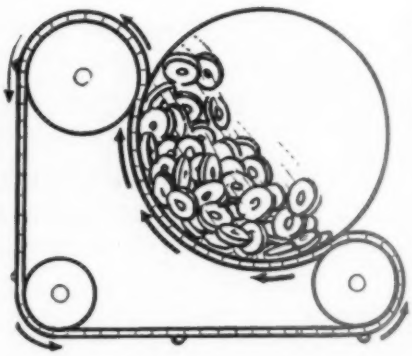
and there's a size and type for every need

The Airless Wheelabrator is the most widely used method of removing sand and scale from castings and other metal parts in use today. Its popularity is the result of many advantages. Heavy loads, for example, are spotlessly cleaned right down to virgin metal in a matter of minutes . . . reducing labor, power, inspection time, space, and equipment to an absolute minimum. Resulting cost savings quickly return the original investment, as an investigation of actual case histories will conclusively prove.

The present need in most shops for equipment that will turn the production curve sharply upward and do the job at lowest unit cost places the Wheelabrator at the top of the buying list for shops large and small. And in the Wheelabrator line . . . the most complete on the market . . . you will find the *exact* size and type of machine to meet your requirements, an important fact to consider when you are asked to buy equipment that may be undersized or oversized as far as your particular needs are concerned.

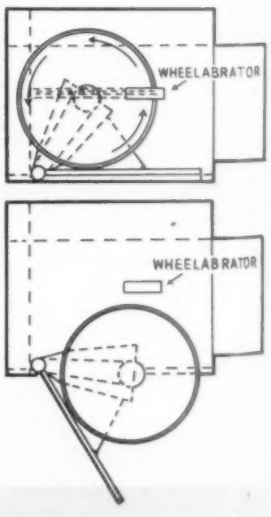
Wheelabrator Tumblasts

The Wheelabrator Tumblast uses the endless conveyor method of tumbling . . . an exclusive *American* feature . . . which completely exposes all surfaces of every piece to the full effect of the abrasive blast. Experience has shown that no other blast mill designed for tumbling work can match its effectiveness. The machine is made in eight standard sizes from 1 cu. ft. to 63 cu. ft. capacity for batch-cleaning heavy pay loads in which individual pieces vary in weight from a fraction of an ounce up to hundreds of pounds.



Wheelabrator Swing Tables

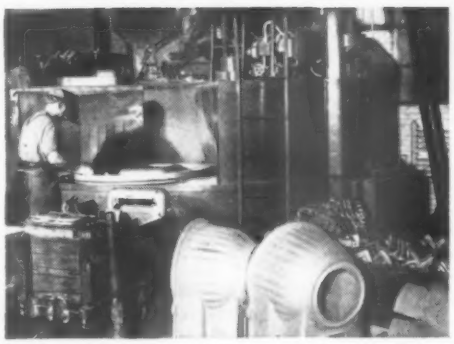
The Wheelabrator Swing Table is a versatile, hygienic, general purpose blast cleaning machine that will handle 80% of all airblast room jobs. It is also ideal for the shop that requires moderately priced equipment capable of handling a wide range of large and small pieces where the daily production does not warrant the purchase of several different types of cleaning equipment. Swing Tables are supplied with 24", 48", 66", 72" and 86" diameter tables. Write for Catalog 214-A.



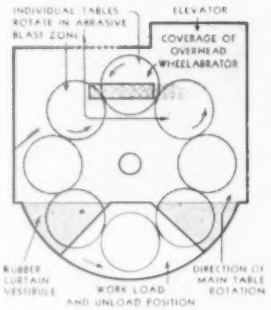
WORLD'S LARGEST BUILDERS OF AIRLESS BLAST

...duction — *Reduces* Unit Cost

Wheelabrator Multi-Tables

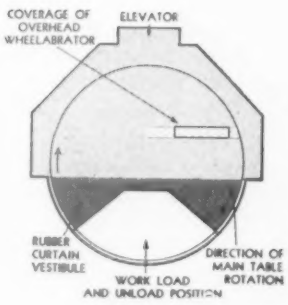


Multi-Tables are recommended for cleaning flat or fragile work which has high vertical edges or deep pockets. Work to be cleaned is placed upon a series of rubber covered work tables mounted on a main spider platform which rotates on a central spindle. As the platform turns about its axis the tables are carried into the cabinet where they revolve as they pass through the blast from one or more Wheelabrators. Movement of work in this manner provides complete coverage of all exposed surfaces. Built in five models with Tables ranging from 8″ to 66″ diameter.

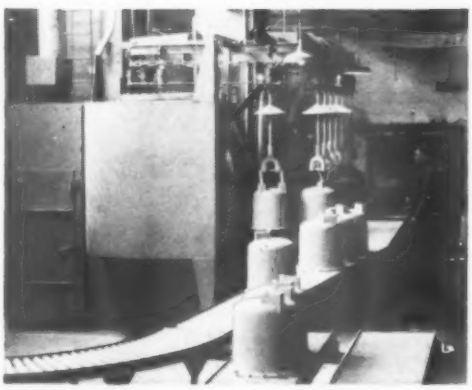

INDIVIDUAL TABLES ROTATE IN ABRASIVE BLAST ZONE
ELEVATOR
COVERAGE OF OVERHEAD WHEELABRATOR
RUBBER CURTAIN VESTIBULE
WORK LOAD AND UNLOAD POSITION
DIRECTION OF MAIN TABLE ROTATION

Wheelabrator Plain Tables

The Wheelabrator Plain Table, with its single rubber covered work table, is designed for handling work which does not have too many pockets or high vertical edges. It is an ideal machine for the jobbing foundry having a varied production of flat or fragile work. Plain Tables are furnished with 6′, 8′, 10′, 12′ and 14′ rubber covered work tables. Write for Catalog 204.



Wheelabrator Special Cabinets



Wheelabrator Cabinets are specially designed for handling work which is of such size, shape, or weight that it cannot be adapted to a standard machine, or where special production requirements prevail.

American's problem-solving engineers offer you a wealth of experience on cleaning and finishing problems . . . all the way from transforming rough ideas into definite plans, to the installation of tested, ready-to-operate equipment. No matter what your cleaning problem may be come to *American* for the practical, economical solution.

Representatives in Principal Cities.

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
505 S. Byrkit St., Mishawaka 2, Indiana

CLEANING EQUIPMENT

(*Continued from page* 106)

pany, McNally Pittsburg Mfg. Corp., the foundry also offers complete machine shop and structural fabrication service, as well as pattern design and metallurgical engineering service.

♦ ♦ ♦

Russell J. Anderson, newly elected president of the Wisconsin Chapter of the American Foundrymen's Association for the year 1947-48, is works manager, Belle City Malleable Iron Co., Racine, Wis. Mr. Anderson served a toolmaker's apprenticeship from 1913 to 1917 and, following two years of service in World War I, entered the foundry industry in 1920 when he joined the Belle City Malleable Iron Co. During the past 27 years he has served in most of the company's departments, supplementing his foundry experience with mechanical engineering and drawing courses at night school and university extension classes. An active member of the Wisconsin Chapter, he served as its vice president last year.

♦ ♦ ♦

J. H. Smith has joined General Electric X-Ray Corp., Chicago, as assistant to President J. H. Clough. Mr. Smith formerly was assistant sales manager of General Cable Corp., New York. Before joining General Cable Corp., he held the post of procurement manager of the Cramp Ship Building Co., Philadelphia. He is a graduate of the University of Pennsylvania and later, while on the business school faculty at the university, he completed work for his PH. D. degree in economics.

♦ ♦ ♦

Charles R. Boreham has been appointed parts and service manager, the Frank G. Hough Co., Libertyville, Ill., manufacturer of road building and material handling equipment. Mr. Boreham will be in charge of parts sales and will supervise servicing of the Company's products. For the past two years he has been associated with the company working in assembly, production control, shipping and receiving.

♦ ♦ ♦

George J. Stanley, vice president and general sales manager, Aluminum Co. of America, Pittsburgh, has retired, following more than 42 years of service in sales and engineering activities. Mr. Stanley joined the Pittsburgh Reduction Co., predecessor of Aluminum Co., in the Boston sales office in 1905. The following year he was placed in charge of electrical design for the company's Niagara Falls and Massena, N. Y., power houses and became superintendent of the power house at Massena. He returned to sales work in 1907 and served in the New York, Rochester, N. Y., and Chicago offices. In 1922 Mr. Stanley was made vice president of the United States Aluminum Co., a manufacturing subsidiary of Aluminum Co. of America, and moved to its Cleveland headquarters. He was sent to Pittsburgh in 1928 as general sales manager for the company and in 1931 was made vice president. He will continue as a director of the firm.

♦ ♦ ♦

J. M. Johnson has been appointed assistant sales manager, Automatic Transportation Co., Chicago. Mr. Johnson had been in charge of sales for the Transporter Division, working directly under **R. L. Wolter,** sales manager of the company. He will assist Mr. Wolter in both the Transporter and Truck Divisions and succeeds **J. A. Baldinger,** formerly assistant sales manager, who has been named assistant to the general manager.

♦ ♦ ♦

Mrs. Thomas S. Hemenway has been named president, treasurer, and chairman of the board of directors, Metal & Alloys Specialties Co. Inc., Buffalo, succeeding her late husband who founded the company. **Richard A. Stockton,** formerly assistant to Mr. Hemenway, has been appointed general manager in charge of plant operation. **Robert A. Dillon,** president, Lake Erie Engineering Corp., and **Keith Williams,** president, Pratt & Letchworth Co. Inc., have been added to the board.

♦ ♦ ♦

Frank Matzek, the General Combustion Co., Birmingham, has been appointed exclusive agent in Alabama, Mississippi and northwestern Florida, for W. S. Rockwell Co., Fairfield, Conn., in the sale of furnaces, ovens, special machinery, burners and valves. **D. A. Gilbert,** 1921 East 55th St., Cleveland, formerly associated with Chase Brass & Copper Co., Cleveland, will handle sale of the company's products in Ohio. **Gil Moore** will act as exclusive agent for the sale of valves in Southern California and **C. E. Hammers,** Peto-O-Fire Co., Los Angeles, for the sale of furnaces and ovens in Southern California.

♦ ♦ ♦

Roy E. Greenwood has been appointed district sales manager for the New York and New England districts of the American Chain Division, American Chain & Cable Co. Inc., Bridgeport, Conn., with headquarters in New York. Mr. Greenwood, who has been with the company for 16 years, had been assistant manager for the Pacific Coast territories for the last several years. Prior to that he had been at the Bridgeport, Conn., Philadelphia and Chicago offices.

♦ ♦ ♦

Carter P. Whitcomb has retired as vice president, Griffin Wheel Co., Chicago. Mr. Whitcomb became associated with the company in 1919 and was elected vice president in 1930. **Charles E. Barnes,** formerly general sales manager, has been elected vice president in charge of sales.

♦ ♦ ♦

H. F. McVay has been elected president, the Delhi Foundry Sand Co., Cincinnati. Other officers of the company, recently elected, include: **Mrs. Lillian S. McVay,** vice president; **Mrs. Ruth Smith**

(*Continued on page* 112)

RUSSELL J. ANDERSON

J. H. SMITH

CHARLES R. BOREHAM

LEWIS-SHEPARD FORK TRUCK

DEPENDABLE POWER

EXIDE-IRONCLAD POWER AND BATTERY ELECTRIC TRUCKS

They're saving time and cutting costs on materials handling jobs like yours

More and more companies, with operating conditions that closely parallel yours, have discovered the way to faster, safer and more economical handling of materials. They have given the job of lifting, hauling and stacking to the efficient battery electric truck and equally efficient Exide-Ironclad Batteries.

The high electrical efficiency of Exide-Ironclad Batteries is due largely to the unique construction of the positive plates. Each of these plates consists of a series of slotted, hollow tubes which contain the active material. So fine are these slots that, while they permit easy access of the electrolyte, they prevent the active material from readily washing out. Not only does this add to life of plates . . . and battery . . . it also provides higher power ability and capacity, assuring dependable, day long performance with maximum safety and minimum maintenance.

Write us for a FREE copy of Exide-Ironclad Topics, which contains "Case Studies" of materials handling problems. It tells how to cut handling costs up to 50% . . . covers latest developments in handling materials from receiving to shipping.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

LEWIS-SHEPARD POWER JACKLIFT

(*Continued from page* 110)

Race, secretary-treasurer; **Charles Brahl,** sales manager, and **Harley McVay,** production manager.

♦ ♦ ♦

William W. Bowring, newly elected chairman of the Detroit Chapter of the American Foundrymen's Association for the year 1947-48, is sales engineer, Frederic B. Stevens Inc., of that city. Mr. Bowring was born in De Pere, Wis., and following graduation from high school he entered the foundry of C. A. Lawton Co., De Pere, where he served in various departments of the organization and supplemented his experience with correspondence courses in drafting and other technical subjects. Subsequently he became superintendent of the Lawton plant. In 1916 he moved to Detroit and became associated with Frederic B. Stevens Inc., where he has since remained. Mr. Bowring is well known to Michigan foundrymen, having served as treasurer of the Detroit Chapter since 1936.

♦ ♦ ♦

Fred Drewes has been named head of the new pig and ingot sales division recently established at Oakland, Calif., by Permanente Metals Corp., Permanente, Calif. **J. L. Joubert,** product specialist, and **T. W. F. Foster,** sales engineer, will assist Mr. Drewes in the new office. All of these men have extensive backgrounds in this field and have been associated with other Henry J. Kaiser-managed companies in the past. Distribution of products will be handled exclusively through Permanente Products Co., which now has district and branch offices throughout the country. The new division's headquarters will be in Oakland, Calif., where national sales are under direction of **Bert Inch,** general sales manager.

♦ ♦ ♦

Elliot R. Jones, who has been elected chairman of the Western New York Chapter of the American Foundrymen's Association for the year 1947-48, is plant superintendent, Lumen Bearing Co., Buffalo. Mr. Jones was born in Aberdeen, Md., and entered the nonferrous foundry industry as a pattern clerk at Lumen Bearing Co. in 1916. After working in various departments he was appointed plant superintendent in 1939. He served as a director of Western New York Chapter from 1943 to 1946 and was vice chairman last year.

♦ ♦ ♦

Ralph W. Rausch, assistant chief engineer at the Pershing Road plant, Link-Belt Co., Chicago, has been appointed chief engineer, succeeding **C. S. Huntington,** who has retired. Mr. Rausch, a graduate of Valparaiso University and Purdue University, has been with the company since 1925. **H. Walter Regensburger,** who has been assistant to the vice president in charge of engineering at the executive offices, Chicago, has been appointed divisional engineer in charge of estimate-engineering at the Pershing Road plant. **Eugene P. Berg,** who has served as assistant to the president since the recent death of E. L. Berry, vice president in charge of production, has been appointed general superintendent at the Pershing Road plant. A graduate of Purdue University, Mr. Berg joined the company in 1929. **Joseph C. Spence,** general superintendent at the plant has been appointed assistant to **Harold L. Hoefman,** recently appointed vice president in charge of manufacturing.

♦ ♦ ♦

Frank Riel, foundry superintendent, Seneca Falls Machine Co., Seneca Falls, N. Y., and for more than 20 years affiliated with the company, retired Aug. 1. Mr. Riel has had a wide and varied experience in the foundry field for the last 50 years.

♦ ♦ ♦

Robert J. Barry, formerly works manager, Hetz Construction Co., Niles, O., has been appointed manager of its brokerage department which handles the obtaining or disposing of surplus plants, equipment, tools, materials, supplies, etc. Mr. Barry was associated with Remington Rand, New York, for 15 years, as an industrial engineer. In 1944 he became a staff member of Daily, Brenner & Schreiber, Chicago, management engineers, serving as efficiency expert for Warren Tool Corp., Warren, O., and joined Hetz Construction Co. a year later.

♦ ♦ ♦

T. W. Eshbach has been put in charge of the new branch office recently opened at 208 South LaSalle St., Chicago, by the industrial department of Dravo Corp., Pittsburgh. The new office, which covers northern Illinois and industrial districts of northwest Indiana, will handle sales and service of the company's equipment for commercial and industrial heating and coolers for air conditioning crane cabs. Mr. Eshbach, a graduate of Lehigh University, was formerly manager of the Heating Division, American Equipment Co., Chicago.

♦ ♦ ♦

L. S. King has been made president of the Dayton Oil Co., Dayton, O., core oil manufacturer. He succeeds the late Dean S. Hopping. Mr. King also has become a director of the company. In addition to Mr. King the board of directors includes E. G. Allen, E. E. Hook, G. R. Sager and J. C. Eismann. No other changes have been made in the company's active personnel.

♦ ♦ ♦

Hugh G. Robertson and **Hubert M. Rishel** now are works managers, respectively, of the Alliance, O., and East Chicago, Ind., plants of American Steel Foundries. Upon graduation from Purdue University in 1926, Mr. Robertson entered the Granite City, Ill., plant of American Steel Foundries as a special apprentice and subsequently was transferred to Alliance where he progressed to the position of assistant works manager before his most recent appointment

(*Concluded on page* 114)

WILLIAM W. BOWRING

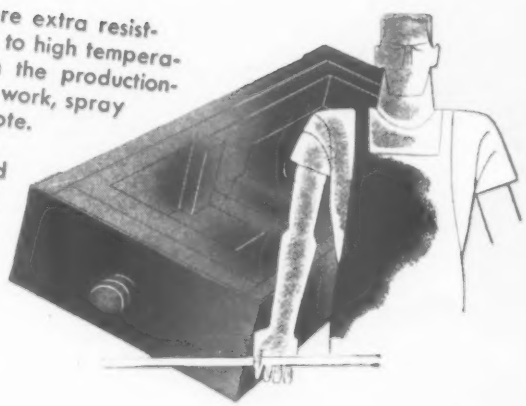
J. L. JOUBERT

ELLIOT R. JONES

3 foundry blackings to meet your needs

cordip For dipping or spraying dry or green sand cores on light production work—it pays to use Cordip. Simple to prepare, easy to use, Cordip comes in powdered form complete with binder. Add water and apply— 20° Beaume for spraying, 35° Beaume for dipping. Will not build up or run on core surfaces. Holds true core dimensions and penetrates sand to prevent burning in.

mexacote Where extra resistance to high temperature metal is demanded in the production-casting of light and medium work, spray molds and cores with Mexacote. Quickly mixed with water to paste consistency, then thinned for spraying. Mexacote forms a firm coating that will not crack, shrink, scab, peel, or buckle under heat, can be dried by torch or lamp.



No. 172 blacking

A high quality wet blacking for cores and dry sand molds, No. 172 Mexican Blacking is easily and smoothly applied with swab, brush, or spray. Turns the hottest iron and allows sand to peel cleanly, making it ideal for medium, extra large, and pressure castings weighing 1 to 25 tons. Ready mixed with bond, requires only water.

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

(*Concluded from page* 112)

about six months ago. He succeeds J. E. Wagner who died last year. Mr. Rishel succeeds J. W. Porter who has undertaken special work in the company's executive office in Chicago. In 1941, Mr. Rishel, then works manager of the Granite City, Ill., plant, was made works manager of the Cast Armor Plant in East Chicago, a post he retained until November, 1945. He then undertook special duties in the executive office with the title of assistant vice president, and remained there until his latest appointment in March, 1947.

♦ ♦ ♦

Herbert W. Kelly has been appointed to supervise all of the foundries actively managed by I. G. Grawoig & Associates, Chicago, management consultants. The foundries include: U. S. Challenge Co., Batavia, Ill.; Hercules Foundry, Centerville, Iowa; Atlas Foundry, Chicago; Anbar Foundry, Chicago; and the two foundries which are an integral part of the American Well Works, Aurora, Ill. Mr. Kelly, who has been chief foundry engineer at Meehanite Metal Co., Chicago, since 1938, will make his headquarters in the Chicago office of I. G. Grawoig & Associates.

♦ ♦ ♦

L. O. Ray Clark has been appointed sales representative for American Air Filter Co., Louisville, to handle sale of air filtration and dust control equipment in Connecticut. Mr. Clark is a graduate of Worcester Polytechnic Institute. Since 1925 he has been manager of the Hartford, Conn., office of the B. F. Sturtevant Co., Boston.

♦ ♦ ♦

J. L. Higson, who was chosen as first chairman of the Rocky Mountain Empire Chapter of the American Foundrymen's Association, is a partner in Western Foundry, Denver. Mr. Higson comes from a family of foundrymen and entered the industry when he was 17 years of age as an apprentice under the supervision of his grandfather and father. He worked as a molder and later became foreman. When the Western Iron Foundry Co., Denver, was incorporated in 1929, he was elected vice president. Ten years later that company organized the Colorado Malleable Casting Co., Denver, and he was elected president. When the latter company was closed during the war because of material shortages, he became a partner with his father, J. Ernest Higson, in Western Foundry. Mr. Higson was active in the organization of Rocky Mountain Empire Chapter, established last January.

♦ ♦ ♦

Harold L. Hoefman has been elected vice president in charge of manufacturing for Link-Belt Co., Chicago. Mr. Hoefman, who has been general manager of the company's Pershing Road plant, Chicago, since 1943, joined that plant in 1920 as a draftsman. He subsequently held various important positions as sales engineer; became district sales manager at Indianapolis in 1932; was appointed manager of the Detroit office and warehouse in 1935; and from 1938 to 1943 was general manager at the company's plant in Atlanta, Ga. **David E. Davidson** succeeds Mr. Hoefman as general manager of the Pershing Road plant. Mr. Davidson, head of the engineering department at that plant since the beginning of the year, is a mechanical engineering graduate of Armour Institute of Technology and joined the company's Caldwell plant, Chicago, in 1924. He subsequently served as a draftsman in various branches of the engineering department at both the Caldwell and Pershing Road plants; became sales engineer at Atlanta in 1935; district sales engineer at Detroit in 1936; and from 1943 through 1946 was district sales manager at Indianapolis.

♦ ♦ ♦

George F. Cronmiller has been elected secretary, Harbison Walker Refractories Co., Pittsburgh. Mr. Cronmiller, who has been assistant secretary for the past 26 years, joined the company in 1913. He succeeds **P. R. Hilleman** who has retired following 55 years of service.

♦ ♦ ♦

J. G. Green has been appointed midwestern representative for the Baker Industrial Truck Division, Baker-Raulang Co., Cleveland. He will make his headquarters at 407 South Dearborn St., Chicago. Mr. Green formerly was assistant general manager, Philco Storage Battery Division, Trenton, N. J., in charge of sales.

♦ ♦ ♦

W. W. Edens, until recently technical director, Ampco Metal Inc., Milwaukee, has joined Badger Brass & Aluminum Foundry Co., Milwaukee. Mr. Edens had been associated with Ampco since 1937. He is chairman of the Brass and Bronze Division, American Foundrymen's Association, and a director of Wisconsin Chapter.

♦ ♦ ♦

C. M. Brooks, who recently resigned as superintendent, Busch Sulzer Bros. Diesel Engine Co., St. Louis, has accepted a similar position at Scovel Mfg. Co., Benton Harbor, Mich.

♦ ♦ ♦

Alex Rankin, formerly foundry superintendent, Lake Erie Engineering Corp., Buffalo, has been appointed foundry superintendent, Niagara Engineering Co., Tonawanda, N. Y.

♦ ♦ ♦

Harold S. Falk, president, Falk Corp., Milwaukee, has been elected a director, Allis-Chalmers Mfg. Co., Milwaukee, to succeed the late Herman Falk.

♦ ♦ ♦

Howard C. Wick has been elected a member of the board of the American Car & Foundry Co., New York. He has been the company's secretary since 1916.

♦ ♦ ♦

Joseph Mullins has been appointed foundry superintendent, G. W. Davis Corp., Richmond, Ind.

HERBERT W. KELLY

L. O. RAY CLARK

J. L. HIGSON

Castings "come clean"...and your troubles float away!

Of course they do! Because this shakeout is *full-floating!*

If your shakeout isn't full-floating, every time you shake a flask—you shake your foundry. The force of your vibrating mechanism has to go somewhere. When part of that force goes into the building structure, you're wasting power. You're adding unnecessary headaches.

The answer is to install a Robins Floatex Shakeout, *the only genuine full-floating shakeout.* The entire frame rides on soft, heavy-duty coil springs. There are only two bearings—and they do not carry any of the load. No need for heavy foundations to absorb shock and vibration!

No wonder Robins Floatex Shakeouts last longer . . . and require far less maintenance!

Every Robins Floatex Shakeout is adjustable to *your* work. In a matter of minutes, you can adjust a Floatex, which has been handling heavy castings, to shake out light or fragile castings safely and without damage.

In fact, Robins Floatex Shakeouts are handling castings weighing an ounce or two—and flasks weighing 100 tons or more.

It will pay you to consult with Robins now, about equipment for *your* foundry. Our experience, covering all phases of this operation—*including self-discharging*—may help to assure the results you are seeking. For complete information, simply drop a line to Robins Conveyors Division, Passaic, N. J. No obligation!

ROBINS CONVEYORS DIVISION...Hewitt-Robins Incorporated, Passaic, New Jersey

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FLOATEX SHAKEOUTS

STATIONARY PORTABLE SELF-DISCHARGING

3 TYPES DESIGNED TO HELP YOU 6 WAYS:

1. Save Time
2. Reduce Labor
3. Help Sand Recovery
4. Cool Hot Sand
5. Minimize Flask Breakage
6. Improve Working Conditions

Around DETROIT

By A. H. ALLEN
Detroit Editor
THE FOUNDRY

Automotive castings banks appear best since postwar production started . . . New car models not expected before end of year or first of 1948

WILTING August heat exerted its usual decelerating influence upon automobile manufacturing. On numerous occasions, with temperatures in the mid-90s, it was almost a physical impossibility for working crews to keep at their jobs, so they either walked out en masse or were sent home. It is unfortunate that these suspensions mean severe kicks in the pocketbook of working forces, and these losses are becoming increasingly hard to take in the face of steadily mounting prices for food, clothing and shelter.

On top of the hot spell came a depletion of inventories of flat-rolled steel which forced suspensions of varying duration, but mostly one week, in nearly all plants throughout the industry. These interruptions were concentrated mainly in sheet steel fabricating, body assembly and final assembly divisions and, where possible, it was the plan to continue foundry operations to build up castings inventories. There is general belief that as of Sept. 1 banks of automotive castings are in better shape than at any time since postwar production was started. This is confirmed by the fact that pressure appears to have eased considerably on suppliers of materials like coke and pig iron.

One reason for the partial easing of pressure on foundries may be that purchasers of castings are in process of balancing out inventories and revising their order practice on more of a short-term basis. Whereas not so long ago buyers were demanding all the castings they could get, with delivery day before yesterday, now they are specifying more realistically, on the basis of requirements for the next month or six weeks. This permits castings producers to schedule operations more intelligently and to keep all customers better satisfied. This in turn softens the pressure on foundry suppliers and they can come out of hiding.

The situation may be only a summer breather, but there is support for the opinion it may continue over the balance of the year and longer. There is no disputing the fact that when postwar production started the sky was the limit on buying policies. Empty pipelines were yawning for materials, equipment and supplies. The ingenuity of sources was sorely taxed to get them filled, so that production could start pouring from the other end. Now it seems likely that supply pipelines are fairly well filled and buying for inventory will slow down progressively. All in all, it will be a good thing.

* * *

NORMALLY, about this time of year, auto plants are swinging over to new passenger car models. Such is not the case this year. The reasons are obvious—unprecedented demand for all the cars that can be built, excessively high costs of tooling for new models, and the delay which always accompanies a model changeover. So, the outlook now is for uninterrupted production of 1947 models through the balance of the year, with first changeovers starting late in December. A couple of exceptions come to mind. Packard has already introduced the first of its 1948 series, a convertible. It will be followed this fall by a still larger convertible and by closed models possibly by the end of the year. Studebaker identifies its current production as 1948 models and presumably will continue them unchanged for another year. Kaiser-Frazer will make no model change for some time, but will introduce new body types in the present series as its next move. Hudson and Nash are fairly well along on tools and dies for the next series of models but are uncertain as to when to schedule them.

The big noise in new passenger car models, when they do arrive, will come from Ford, where company officials already are publicly proclaiming the most comprehensive model change program for the entire line in the history of the company, or of the industry for that matter. The designs have been under development for nearly all of this year, but may not be in production before January or February. The order of introduction will be new trucks first, then the Lincoln, followed by the Mercury and then the Ford. Completely revised body lines will be featured on all models. They will be lower and wider, with more glass. Transverse springing will be abandoned. New 8-cylinder engine has been developed for the Lincoln, and a new power plant may be offered in the Mercury. Styling of the Mercury will be sharply different from that of Ford, which has not been the case in the past.

E. R. Breech, Ford executive vice president, says the 1948 program is being pushed through successfully in half the time any other company would require to complete it, and he is probably right, in view of the large capacity the company operates for production of new tooling, dies, jigs and fixtures. As of a month ago, Ford noted expenditure of over $17 million on the new model program which, in view of today's inflated costs, does not sound overly high, particularly considering three separate models are involved. On a year's production of 1,000,000 units, this would amount to only $17 per car. The final figure probably will be twice this amount.

New Bodies Developed

As things stack up now in the General Motors family, there is a sort of three-phase model planning under way. Completely new bodies have been developed for larger cars in the Buick, Olds and Cadillac lines. They are understood to be wider and lower, with improved vision, but marking no radical break from tradition. Smaller models in the Chevrolet, Oldsmobile, Pontiac and Buick lines are slated to receive another "facelifting" treatment and to be in production in January as 1948 models of these makes. Thirdly, tools and dies have been started for completely new Chevrolet-Olds-Pontiac bodies in the 1949 line. They will not be finished until possibly next spring and the cars in production by late summer. This lineup is of course subject to some change, but that is about the way it stands at the moment.

Chrysler divisions remain an enigma as far as new models are concerned. There has been talk of a limited amount of die work released for passenger cars by Plymouth, Dodge, De Soto and Chrysler, but it is not of the proportions which would indicate any early overall restyling. Best guess is that the 1948 models of this manufacturer will be refurbished versions of the same basic body designs, and new bodies deferred until next fall.

* * *

FOUNDRY equipment manufacturers report slower demand for standard types of equipment, as far as any new projects are concerned. However, backlogs are still substantial, although delivery dates on such items as cupolas, molding machines and the like are appreciably improved. Both the Pontiac and Chevrolet

(*Concluded on page* 118)

AMERICA'S ANSWER

How can we advance the standard of living?

How can we meet the coming foreign competition?

How can we maintain industrial and commercial leadership?

America knows that the answer is

INCREASED PRODUCTION

Increased production is our business in the foundry field. To plan and equip new plants and to redesign existing plants for

MAXIMUM PRODUCTION WITH MINIMUM COST

A CONOVER SURVEY would show you existing conditions and make constructive recommendations.

CLEVELAND AND DETROIT

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(*Concluded from page 116*)

gray iron foundry building projects are some distance from completion, although going forward at a satisfactory pace.

* * *

New automatic belt unloader utilized to carry sand to the porduction molding line at the gray iron foundry of Pontiac Motor Division, Pontiac, Mich., is shown here. At right is shown the sand belt passing an unloading station where the proper amount is deposited in the hopper at the left and falls down a chute through to the floor below and into the molding machine hopper, as shown in the other illustration. The automatic belt unloader is reported to have made possible the use of a redesigned hopper which carries only slightly more than enough sand for a single mold, thereby eliminating packing and caking experienced when larger hoppers were used.

The unloader operates only when a flask at the machine has been filled, delivering just enough sand for the next mold. It is equipped with a serrated baking plate synchronized with the amount of sand to be delivered, and a variable-speed transmission. Supply of aerated and cooled sand on the conveyor belt is constantly and automatically proportioned so that each storage hopper will receive the correct amount, regardless of the number of hoppers on the line. Spilled sand is said to be reduced to a minimum.

Interstate Foundry Co. Inc., Indianapolis, has completed a new building addition, designed to enlarge its gray iron automotive parts and job castings facilities.

Gray Iron Founders Meet Oct. 2-3

Business program for the Annual Meeting of the Gray Iron Founders' Society, to be held at the Hotel Schroeder, Milwaukee, Oct. 2 and 3, will feature discussions of numerous problems now confronting the gray iron industry. The first session will include reports of officers and committes, including a special study of the industry which recently has been completed by the executive vice president.

The afternoon session will feature several speakers discussing employment problems of gray iron foundries. The session will be followed by a social hour in the grand ballroom of the Schroeder.

Friday morning three speakers will discuss the outlook for pig iron, coke and scrap. This will be followed by the election of directors, who will be introduced at the luncheon to follow.

In addition to the business program, special attention is being given to committee meetings, social functions, and entertainment for ladies.

The tentative program for the day meeting is as follows:

THURSDAY, OCT. 2

8:30 a.m.—Registration

10:15 a.m.—Morning Session—Banquet Room
Remarks of President, Howard A. Stockwell, Barbour Stockwell Co., Cambridge, Mass.
Report of Treasurer, Homer Britton, Cleveland Foundry Co., Cleveland.
Report of Cost Committee, Arthur E. Hageboeck, Frank Foundries Corp., Moline, Ill.
Report on Foundry Education Foundation, J. M. Price, Ferro Machine & Foundry Co., Cleveland.
Report of Executive Vice President, Raymond L. Collier.

12:30 p.m.—Industry Luncheon
Presentation of Retiring Board of Directors
"Need for Better Selling Today" Herbert L. Tigges, vice president and sales manager, Baker Brothers Inc., Toledo.

2:30 p.m.—Afternoon Session
"Labor Relations Problems Under the Taft-Hartley Act," John Lovett, general manager, Michigan Manufacturers' Association, Detroit.
"Regularization of Employment in Gray Iron Foundries." B. A. Krawczyk, supervisor, Compensation Department, Allis-Chalmers Mfg. Co., Milwaukee.

4:00 p.m.—Committee Meetings

5:30 to 7:00 p.m.—Social Hour—Refreshments and Buffet Supper—Grand Ballroom

FRIDAY, OCT. 3

9:00 a.m.—Registration

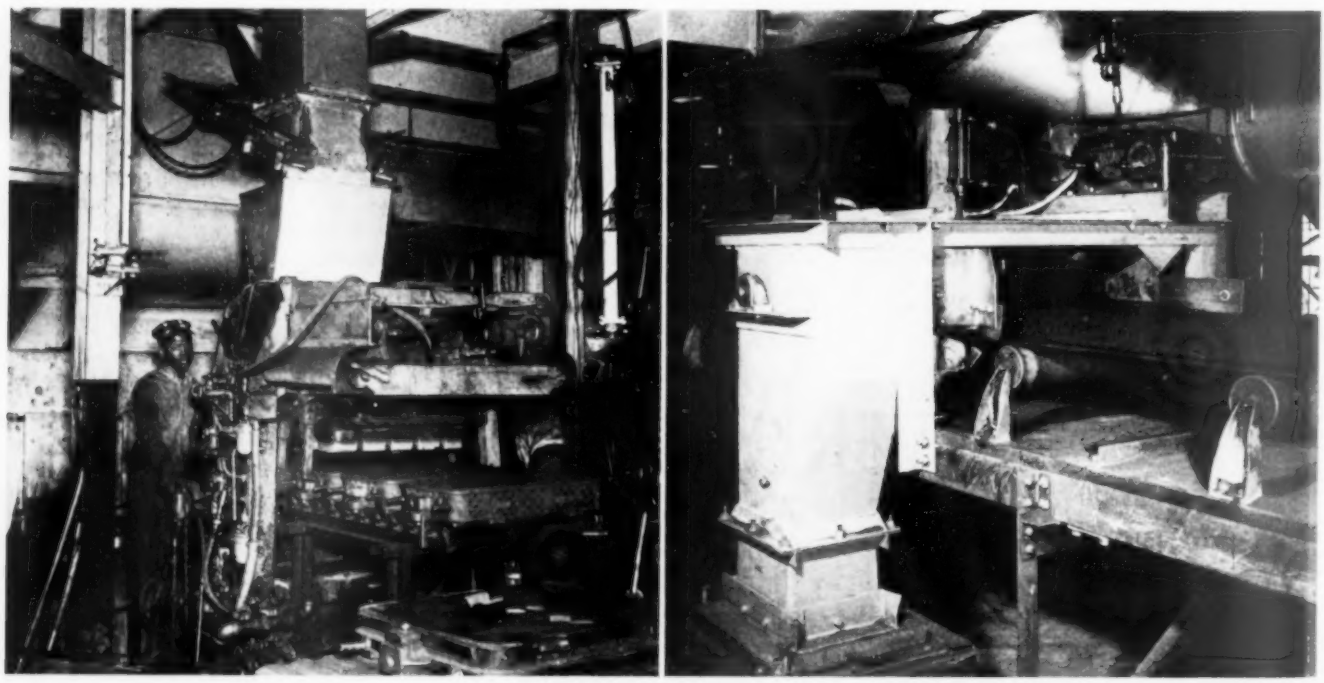
10:00 a.m.—Morning Session—Banquet Room
"Outlook for Foundry Pig Iron," William Kerber, vice president, Hanna Furnace Corp., Detroit.
"Outlook for Foundry Coke," Samuel Weiss, executive secretary, American Coke & Coal Chemicals Institute, Washington.
"Outlook for Cast Scrap," Edwin C. Barringer, executive secretary, American Institute of Scrap Iron & Steel, Washington.

11:45 a.m.—Election of Directors

12:30 p.m.—Industry Luncheon—Grand Ballroom
Introduction—New Board of Directors
Introduction—New Fresident and other officers
Presentation of Citations and Awards
"What's Ahead for Business?" Dr. Alfred P. Haake, economist, Chicago.

National Founders Plan Convention

Annual convention of the National Founders Association will be held at the Waldorf-Astoria, New York, Thursday and Friday Nov. 6-7. Speakers are being selected for the value and timeliness of subjects before the foundry industry. The alumni dinner of the association will be held on Wednesday, Nov. 5 at the Waldorf-Astoria.



Automatic belt unloader installed in the gray iron foundry, Pontiac Motor Division, Pontiac, Mich.

BACKGROUND FOR SUCCESS
The quality of materials used in making steel and iron is the basis of their ability to meet today's stringent requirements.
The excellent quality of VANCORAM ferro-alloys, consistent from lot to lot, aids manufacturers in the production of steels and irons for maximum performance both in processing and in use.
Our metallurgists will be glad to cooperate with you on specific applications.
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Foundry Developments

By EDWIN BREMER

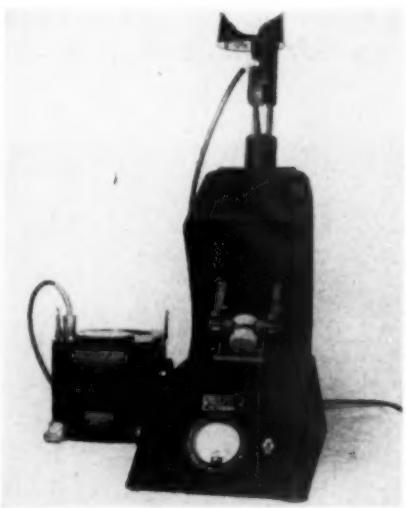
NEW APPLICATION of the "Sinter Meter" used extensively for determining refractoriness of molding materials such as foundry sands, is to compare and check the accuracy of optical pryometers. The instrument shown in the accompanying illustration and made by Harry W. Dietert Co., Detroit, is designed so that an optical pyrometer is held in position while the readings on the temperature of the heated platinum ribbon are taken. A master pyrometer is used to determine the ribbon temperature, which may be held at any desired point up to 3000°F, and working pyrometers then are used to take check readings. Constant temperature in the meter is assured by use of a voltage control transformer. Platinum target is 5/8 x 1½ in. in area.

• • •

TO MEET the problem of determining acceptability in brass and bronze castings whose value is insufficient to justify 100 per cent radiographic examination the Pittsburgh Testing Laboratory has devised a single-exposure technique of inspection which has proved more than 90 per cent efficient on several pressure valve components. Results of the technique prove that in some instances a single radiograph taken at random or of an area known to be questionable, can provide all the information necessary to separate prior to machining acceptable brass or bronze castings from those which are unacceptable. Technique is based on correlating radiographs with results disclosed by machining. It was discovered that some castings leaked during air pressure tests despite the absence of any large irregularities in the radiograph. That meant leakage must be dependent upon the "quality" of the cast metal. In consequence obvious defects in the castings were more or less ignored in radiographic interpretation. What was studied was the soundness of the metal between flaws. That disclosed that castings whose radiographs showed a fine-grain structure often were acceptable despite gas pockets and similar irregularities, depending upon their nature, size and location. However, if the radiograph showed a mottled, hazy background interspersed with dark pin-points of fine, sand-like inclusions, experience indicated the casting would leak when subjected to pressures of 10 to 250 psi. The method which calls for a solid groundwork in radiography and careful correlation makes it possible to judge the castings' acceptability while keeping sorting costs low.

• • •

SCIENTISTS at the National Bureau of Standards are engaged in an extensive program of determining the effectiveness of concrete as a protective barrier against million-volt, wide-beam x-rays whose use is increasing in industry and medicine. At the present time exact wall thicknesses and most desirable types of construction necessary for maximum short wave-length x-ray protection are not known definitely. One of the basic aims is to collect data from which the highest degree of protection with lowest possible cost of installation can be calculated. To determine protection standards, a million and one-half volt x-ray machine in the bureau's laboratories has been converted so that it will produce beams of varying widths. It is



"Sinter Meter" is used to check accuracy of optical pyrometers

mounted so that it can be directed downward into a "radiation pit" about 6 ft square and 20 ft below the target of the x-ray tube. Special instruments designed to explore the strength of radiation in the pit can be shifted to various positions. During investigations test slabs of concrete 6 in. thick and weighing 2½ tons are placed over the mouth of the pit, one at a time, permitting variation in the protective barrier from 6 in. to 5 ft in thickness.

• • •

INFORMATION on the properties of methyl cellulose and cellulose glycollic acid as core binders for light metal alloys is presented in an article by O. R. J. Lee in the June 12 issue of *Foundry Trade Journal*. The author points out that those materials were used in Germany during the war and claimed to provide low hot strength which overcomes tearing difficulties, low gas evolution, and low temperature of decomposition for excellent knockout characteristics. The materials are sawdust-like solids called "Alkylin", and previous to use they are mixed with water and allowed to stand overnight to gelatinize; then mixed with the sand. One part by weight of the material is mixed with 7 parts water, and that emulsion is mixed with dry silica sand in the ratio of about 8 parts by weight to 100 parts sand. Cores are baked at 150 C (302 F). Tests on specimens indicate for the methyl cellulose a dry compression strength of 115 psi; dry permeability of 126, and a gas evolution of 9.4 cc per gram. The cellulose glycollic acid showed a dry compression strength of 301 psi; dry permeability of 147, and a gas evolution of 6.4 cc per gram. Sand used in tests was silica in which the fractions retained on 60 mesh and passing 100 mesh were removed.

• • •

MENTION has been made numerous times of the efficacy of manganese ore in degasifying bronze melts by placing about 1 per cent by weight in the bottom of the crucible previous to charging. Recently in a paper presented before the Institute of British Foundrymen on "Control of Bronze Melts for the Production of Pressure Tight Castings," W. A. Baker stated that use of marble chips is rather more certain than manganese ore in the case of phosphor bronze melts. Procedure is to take marble chips equal to 0.25 to 0.50 per cent of the melt weight and insert them loosely in a salamander (phosphorizer) tube about 3 ft long, 1½-in. ID, ½-in. wall thickness; blocking the end roughly with a piece of crumpled copper foil. Tube is inserted in the molten metal open end down, and the heated marble evolves carbon dioxide which bubbles up vigorously through the melt.

• • •

IT IS reported that one foundry has done considerable development work on a molding procedure to produce iron and steel castings to close dimensional tolerances. Castings weigh from one pound to a ton and include molds, dies, grinding plates and repetitive machine parts ordinarily involving costly machining.

LEAST HANDLED..

IS BEST HANDLED

Logan Roller Conveyor in nationally known foundry. Molds move from molding machines in rear to pouring zone in foreground. Note use of spreader bars to increase capacity of conveyors for small molds.

Poker hands and feminine hands can be expensive, yes sir!

But most costly of all hands are those you pay for in those weekly shop pay envelopes. For this is a continuous cost element and in most plants the largest of all operating expenses.

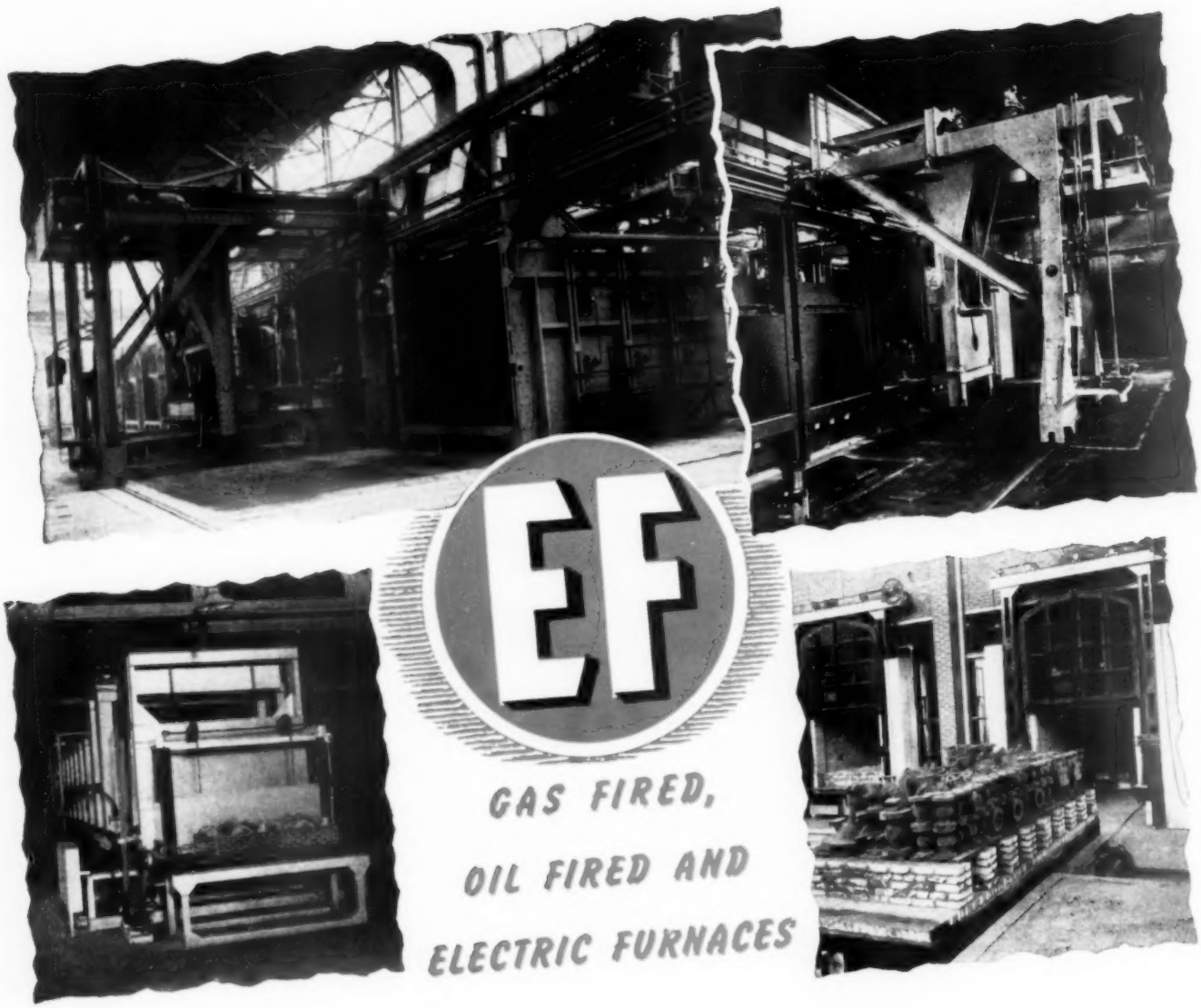
Paring down the amount of manual handling is a prime function of Logan equipment. With Logan Conveyors on the job the number of pick-ups and lay-downs of work in process is reduced to a minimum.

And, because mechanized, a smooth, continuous, profitable flow of movement is generated from molding machines, to pouring, shake-out, and through machining.

Hundreds of Logan installations bear out the soundness of the statement "Least handled is best handled."

Logan Conveyors

LOGAN CO., INC., 580 CABEL STREET, LOUISVILLE 6, KY.



to speed production, and cut your costs

For short cycle malleabilizing, and annealing or normalizing steel, aluminum or magnesium castings, select an EF furnace,—they are built in many different designs, and in sizes to meet any requirement. Each installation is engineered and built specially for the particular and individual need,—thus assuring the smooth, continuous flow of material through the heat treating process, fully up to the desired capacity and physical specification.

EF furnaces will give you the utmost in efficiency and economy, and reflect the advantage of many service-proved features—conceived and perfected by EF engineers—and available only in EF design. These advantages include the EF radiant tube and EF heat exchanger, which combine to assure extremely high combustion efficiency; EF heavy, cast alloy electric heating elements, EF roller design and mounting, EF special atmosphere generators and many other devices that assure uniform temperature throughout the furnace, accurate control of heat within the required limits, low maintenance, high hourly outputs, and uniform, low cost, dependable operation.

Let EF engineers with their long and outstandingly successful experience work with you on your next heat treating job!

EF

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GAS FIRED, OIL FIRED AND ELECTRIC FURNACES
FOR ANY PROCESS, PRODUCT OR PRODUCTION

WILSON ST. AT PENNA. R.R.
Salem-Ohio

GLOSSARY OF TERMS EMPLOYED IN HEAT TREATING OPERATIONS

INTRODUCTION—This Glossary of Heat Treating Terms is not intended to be a specification and it should not be interpreted as such. Since this glossary is intended to be strictly a set of definitions, temperatures have been omitted purposely.

AGE HARDENING—A process of aging that increases hardness and strength and ordinarily decreases ductility. Age hardening usually follows rapid cooling or cold working. See Aging.

AGING—In a metal or alloy, a change in properties that generally occurs slowly at atmospheric temperature and more rapidly at higher temperatures. See also Age Hardening, Precipitation Hardening and Strain Aging.

ANNEALING—A process involving heating and cooling, usually applied to induce softening. The term also refers to treatments intended to alter mechanical or physical properties, produce a definite microstructure, or remove gases. When applicable, the following more specific terms should be used:

Black annealing
Blue annealing
Box annealing
Bright annealing
Full annealing
Graphitizing
Isothermal annealing
Malleablizing
Process annealing
Spheroidizing
Stabilizing annealing

Definitions of the above terms are given in their alphabetical positions in this glossary. When applied to ferrous alloys, the term "annealing", without qualification, implies full annealing. Any process of annealing will usually reduce stresses, but if the treatment is applied for the sole purpose of such relief, it should be designated as "stress relieving".

AUSTEMPERING—A trade name for a patented heat treating process that consists in quenching a ferrous alloy from a temperature above the transformation range, in a medium having a rate of heat abstraction sufficiently high to prevent the formation of high-temperature transformation products; and in maintaining the alloy, until transformation is complete, at a temperature below that of pearlite formation and above that of martensite formation.

AUSTENITIZING—The process of forming austenite by heating a ferrous alloy into the transformation range (partial austenitizing) or above the transformation range (complete austenitizing).

BLACK ANNEALING—A process of box annealing or pot annealing ferrous alloy sheet, strip or wire after hot working and pickling. See box annealing.

BLUE ANNEALING—A process of softening ferrous alloys in the form of hot rolled sheet, by heating in the open furnace to a temperature within the transformation range and then cooling in air. The formation of a bluish oxide on the surface is incidental.

BLUING—A treatment for improving the appearance and resistance to corrosion of ferrous alloys by subjecting the surface, initially free from scale, to the action of air, steam, chemicals or other agents at a suitable temperature, thus forming a thin blue film of oxide.

NOTE: This term is ordinarily applied to sheet, strip or finished parts. It is used also to denote the heating of springs after fabrication, in order to reduce the residual stress caused by coiling and forming.

BOX ANNEALING—A process of annealing a ferrous alloy in a suitable closed metal container, with or without packing material, in order to minimize oxidation. The charge is usually heated slowly to a temperature below the transformation range, but sometimes above or within it, and is then cooled slowly. This process is also called "close annealing" or "pot annealing". See Black Annealing.

BRIGHT ANNEALING—A process of annealing usually carried out in a controlled furnace atmosphere so that surface oxidation is reduced to a minimum and the surface remains relatively bright.

BRUNORIZING—The trade name for a special treatment applied to steel rails that are cooled to a temperature below the transformation range, are reheated to a temperature slightly above that range, and then are allowed to cool in the air. The ends of the rails are partially quenched by jets of compressed air.

BURNT—A term applied to a metal permanently damaged by being heated to a temperature close to the melting point.

CARBONITRIDING—A process in which a ferrous alloy is case hardened by first being heated in a gaseous atmosphere of such a composition that the alloy absorbs carbon and nitrogen simultaneously, and then being cooled at a rate that will produce the properties desired.

CARBURIZING—A process that introduces carbon into a solid ferrous alloy by heating the metal in contact with a carbonaceous material—solid, liquid or gas—to a temperature above the transformation range and holding at that temperaure. Carburizing is generally followed by quenching to produce a hardened case.

CASE—In a ferrous alloy, the surface layer that has been made substantially harder than the interior or core by a process of case hardening.

Prepared by the *Joint Committee on Definition of Terms Relating to Heat Treatment* sponsored by the American Society for Testing Materials, American Society for Metals, Society of Automotive Engineers, and the American Foundrymen's Association. As revised in Dec., 1946.

GLOSSARY OF TERMS EMPLOYED IN HEAT TREATING OPERATIONS

CASE HARDENING—A process of hardening a ferrous alloy so that the surface layer or case is made substantially harder than the interior or core. Typical case-hardening processes are carburizing and quenching, cyaniding, carbonitriding, nitriding, induction hardening, and flame hardening.

CEMENTATION—The process of introducing elements into the outer layer of metal objects by means of diffusion at high temperature.

CONTROLLED COOLING—A process of cooling from an elevated temperature in a predetermined manner, to avoid hardening, cracking or internal damage, or to produce a desired microstructure. This cooling usually follows the final hot forming operation.

CORE—In a ferrous alloy, the interior portion that is substantially softer than the surface layer or case, after case hardening.

CRITICAL RANGE or CRITICAL TEMPERATURE RANGE—Synonymous with transformation range, which is preferred.

CYANIDING—A process of case hardening a ferrous alloy by heating in a molten cyanide, thus causing the alloy to absorb carbon and nitrogen simultaneously. Cyaniding is usually followed by quenching to produce a hard case.

DECARBURIZATION—The loss of carbon from the surface of a ferrous alloy as a result of heating in a medium that reacts with the carbon.

DIFFERENTIAL HEATING—A heating process by which the temperature is varied within the object so that, after cooling, various parts may have different properties as desired.

DIRECT QUENCHING—A process of quenching carburized parts directly from the carburizing operation.

DRAWING—See tempering.

FLAME ANNEALING—A process of softening a metal by the application of heat from a high-temperature flame.

FLAME HARDENING—A process of hardening a ferrous alloy by heating it above the transformation range by means of a high-temperature flame, and then cooling as required.

FULL ANNEALING—A softening process in which a ferrous alloy is heated to a temperature above the transformation range and, after being held for a sufficient time at this temperature, is cooled slowly to a temperature below the transformation range. The alloy is ordinarily allowed to cool slowly in the furnace, although it may be removed and cooled in some medium that ensures a slow rate of cooling.

GRAPHITIZING—A heating and cooling process by which the combined carbon in cast iron or steel is transformed, wholly or partly, to graphitic or free carbon. See temper carbon.

HARDENABILITY—In a ferrous alloy, the property that determines the depth and distribution of hardness induced by quenching.

HARDENING—Any process for increasing the hardness of metal by suitable treatment, usually involving heating and cooling.

HEAT TREATMENT—A combination of heating and cooling operations, timed and applied to a metal or alloy in the solid state in such a way as to obtain desired conditions or properties. Heating for the sole purpose of hot working is excluded from the meaning of this definition.

HOMOGENIZING—A process of heat treatment at high temperature intended to eliminate or decrease chemical segregation by diffusion.

HOT QUENCHING—A process of quenching in a medium at a temperature substantially higher than atmospheric temperature.

INDUCTION HARDENING—A process of hardening a ferrous alloy by heating it above the transformation range by means of electrical induction, and then cooling as required.

INDUCTION HEATING—A process of heating by electrical induction.

INTERRUPTED QUENCHING—A process of quenching in which the metal object being quenched is removed from the quenching medium while the object is at a temperature substantially higher than that of the quenching medium.

ISOTHERMAL ANNEALING—A process in which a ferrous alloy is heated to produce a structure partly or wholly austenitic, and is then cooled to and held at a temperature that causes transformation of the austenite to a relatively soft ferrite-carbide aggregate.

ISOTHERMAL TRANSFORMATION—The process of transforming austenite in a ferrous alloy to ferrite or a ferrite-carbide aggregate at any constant temperature within the transformation range. See transformation range.

MALLEABLIZING—A process of annealing white cast iron in which the combined carbon is wholly or partly transformed to graphitic or free carbon or, in some instances, part of the carbon is removed completely. See temper carbon.

MARTEMPERING—The process of quenching an austenitized ferrous alloy in a medium at a temperature in the upper portion of the temperature range of martensite formation, or slightly above that range, and holding in the medium until the temperature throughout the alloy is substantially uniform. The alloy is then allowed to cool in air through the temperature range of martensite formation.

NITRIDING—A process of case hardening in which a ferrous alloy, usually of special composition, is heated in an atmosphere of ammonia or in contact with nitrogenous material to produce surface hardening by the absorption of nitrogen, without quenching.

(To be concluded)

Memo

TO MANAGEMENT:

YOUR FOUNDRY MODERNIZATION PROGRAM

must provide for

EFFICIENT UTILIZATION OF PRESENT FACILITIES

Any Foundry Modernization program must provide for efficient plant layout in all departments with mechanization that is justified economically. Properly planned, the program may be put into effect over a two to five year period, virtually paying for itself out of savings as it develops.

Patterns, flasks, machines, core boxes, etc. must be rigged to permit maximum production per man-hour if foundries are going to survive and prosper in the competitive days ahead. Producers must be serviced and allowed to produce full time. Proper Job Evaluation and a fair and equitable Wage Incentive both can be utilized as tools of management to secure highest production at lowest cost.

Whether your problem is the improvement of a single department or design of a complete new plant, the Lester B. Knight organization can help you. Knight offers the services of more than thirty men, each with 15 to 35 years of foundry management, production, engineering or equipment experience in every type foundry -- gray iron, steel, malleable, brass and bronze, magnesium and aluminum.

Plan for the future now. Our experienced staff can assist you to develop a Foundry Modernization Program that will pay for itself and insure the successful operation of your foundry in the competitive days ahead.

KNIGHT Service for Foundries:

- Foundry Engineering
- Architectural Planning
- Foundry Layout
- Foundry Modernization
- Foundry Management
- Industrial Engineering; Job Evaluation, Incentives
- Production and Cost Control

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ERIE FOUNDRY INDUSTRY

Once Depended on Local Ore

By EARL M. STRICK
Erie Malleable Iron Co.
Erie, Pa.

IN 1832, young Henry Jarvis and his brother were operating a tannery and saw mill in Westfield, N. Y. Looking over some parts of iron purchased in a Westfield hardware or general store, they marveled at the performance of the metal, and learning that some of the metal had been discovered near Erie, Pa., about 40 miles west of Westfield, they decided to investigate. In Erie they visited a number of business places and learned that the ore from which the metal was made had been discovered on some property owned by the Reed Estate 4 miles west of Erie on the waterfront at the head of the bay. (The property today is the Algeria Farm where the road leads to Presque Isle State Park).

The iron ore there was called bog ore. The vein was only a few feet thick and was exhausted in a few years.

Shipped Iron To Pittsburgh

After a thorough investigation of the possibilities of melting ore in Erie, Mr. Jarvis decided to erect a furnace to smelt it and then ship the pig iron by barge through the Erie Canal to Pittsburgh. The canal joined Presque Isle Bay east of Sassafras street and cut through the city at Myrtle, then followed the present Nickel Plate Railroad tracks west to Girard, and from there south to Pittsburgh, at that time the great iron and steel center of America.

In 1833, the first foundry in Erie was built by Henry Jarvis on the west side of State street just below Eleventh and a little west toward Peach street. Finding it too long and difficult to haul by horse and wagon from the mine 4 miles west of the newly erected furnace, Mr. Jarvis contracted with the mine owners to build a number of small scows and haul the ore by water to the municipal pier located at the foot of French street. As French street was the only thoroughfare west of Parade street which cut through the city from the water front, the ore was carted up that street from the pier to the foundry which was located at 11th & State Streets, at that time an unsettled part of the city. The smelting of iron proved to be a profitable business and the production was insufficient to meet the demands of the Pittsburgh interests to whom it was shipped.

Seeing the vast possibilities of manufacturing the iron into finished products, an addition was put on the old furnace building for the purpose of manufacturing stoves, and soon Erie became the center of the stove business in this country. Two large companies, the Sennett & Barr Stove Works, located adjacent to the Jarvis furnace, and the Chicago Stove Works, on the bank of the Canal at Twelfth and Myrtle streets, were started.

As the city was progressing south from the lake front, the iron business became most prominent in the district from Ninth to Sixteenth streets and from Old French road, or Parade street, to the Canal near Myrtle street.

In the 1840's, another progressive group

Emma Gammiero, employee of Erie Malleable Iron Co., sits beside a stove manufactured in 1857 by the Sennett & Barr Stove Co. The stove is made of iron obtained from a bog ore deposit once located 4 miles west of Erie

of Erie citizens, connected with the Jarvis foundry, erected what was known as Foundry No. 2 or the New Foundry, on the east side of present State street just above Eleventh, and the iron smelted there was used exclusively for steam engines made by the Erie City Iron Works located where the present Commerce building now stands, and the Ball Engine Co. where the Twelfth Street Market now is. The Nagle Engine & Boiler Works at Sixteenth and Holland and the Jarecki Mfg. Co. on Ninth street near Holland soon came into existence, using iron from this new furnace.

A Mr. Black was taken into partnership with Sennett & Barr and this company became Sennett, Barr & Black. Then Ed Germer purchased the Sennett and Barr interests and the company became the Black & Germer Co., which moved to a newly erected plant at Sixteenth and Parade or Old French road, next to the Nagle Engine & Boiler Works. With the expansion of the city southward, these iron industries soon moved east and westward along what had become the main railroad route through the city.

With the city's expansion toward the south and the railroad passenger station at the foot of the present State street being abandoned, the railroad running along the water front became an important freight line between Erie and Pittsburgh.

When the iron supply was exhausted, causing the mines to close, deposits of high grade ore were discovered in the Superior district of upper Michigan and Minnesota. This was transported to Erie by boat and then hauled by rail to the great steel center of Pittsburgh. Returning, these ore cars brought back to Erie the coal from the Pennsylvania mines which was transported to the Upper Lakes region by the boats which had brought the ore into Erie. This made Erie one of the most important lake ports in the world.

Erie Becomes Foundry Center

The city of Erie owes the greater part of its wealth and prosperity to the foundry business started in 1833. By 1900 Erie had become one of the leading foundry centers of the country, and that reputation still maintains today. From one small foundry in 1833, the number has increased to 28, some making castings for outside interests while others operate the line of products they manufacture.

Annual business of the foundries runs into millions of dollars, and hundreds of satisfied workers are employed by the industry. This can be verified by the fact that today there are approximately 500 men and women working in the foundries of Erie with service of 30 years or more, and that at present the average number of years' service of the men and women in the foundries ranks highest of any industry. This alone proves that the foundry is a good place in which to work. Men today are as proud to be foundrymen as were the oldtimers.

As an indicator of the present size of the industry in Erie, the following firms operate foundries exclusively or maintain a foundry division:

American Sterilizer Co., Bucyrus-Erie Co., Cascade Foundry Co., Erie City Iron Works, Cascade-Paradine Mfg. Co., Erie Castings Co., Erie Bronze Co., Erie Engine Co., Erie Malleable Iron Co., Erie Forge & Steel Co., General Electric Co.,

(*Concluded on page* 128)

MELT METAL FASTER—EASIER—CHEAPER—WITH DETROIT ELECTRIC FURNACES

For fast, economical melting of ferrous and non-ferrous metals, it will pay you to install one or more Detroit Rocking Electric Furnaces in your foundry. *They are compact*—available in a wide range of models for melting various types of alloys—and they are built with all controls within easy reach to permit one-man operation. Since melting takes place in a rocking closed chamber where heat, atmosphere, composition, and other melting factors can be closely controlled, the metal produced is of *higher quality and assures better castings* with fewer rejects.

The experience of a large foundry in eastern U. S. typifies the production efficiency and economy obtained with Detroit Electric Furnaces. A Type AA, 400 Kw. Detroit Electric Furnace of 1500 lb. nominal cold charge capacity, 3000 lb. molten metal capacity, used in a partial duplexing operation, produces ten 1000-lb. heats of high tensile strength alloy iron (45,000 lb. sq./in.) *per 8-hour day.* Power consumption is only 500 Kwh per ton.

Here is a partial list of the many products made of metal melted in Detroit Electric Furnaces: Manhole Covers • Cement Mill Equipment • Corrosion- and Abrasion-Resistant Castings for Chemical Equipment • Elevator Sleeves and Drums • Nozzles, Valves, and other Fire Fighting Apparatus • Steam-Jacketed Kettles, Baking and Mixing Machinery • Tractor and Stationary Engine Cylinder Blocks, Pistons, Piston Rings, Manifolds, Cam Shafts, Crankshafts • Compressors, Manifolds, and Connecting Rods for Refrigeration Equipment • Brass, Monel, and Nickel Plumbing Valves • High Pressure Oil Valves and Fittings • Valves, Pumps, Housings, Stokers, Grates, Compressor Parts, and Steam Engine Parts for a Wide Variety of Mechanical Equipment.

Your nearby Detroit Electric Furnace Representative will discuss your production problems with you and show you how these modern, versatile furnaces will speed low-cost metal melting in your foundry.

DETROIT ELECTRIC FURNACES

DETROIT ELECTRIC FURNACE DIVISION • KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Concluded from page* 126)

Griswold Mfg. Co., Hays Mfg. Co., Jarecki Mfg. Co., Keystone Brass Co., Kondu Corp., National-Erie Corp., Peters Foundry Co., Reed Mfg. Co., Standard Stoker Co., Skinner Engine Co., Superior Bronze Co., Tanner Mfg. Co., U. S. Metal Products Co., Urick Foundry Co., Victoria Metal Co., Weil-McLean Co., West Side Mfg. Co., Zurn Mfg. Co.

Large foundries once located in Erie but since gone out of business or moved to other locations include:

Germer Stove Co., Chicago Stove Co., Odin Stove Co., Gloeckler Mfg. Co., Campbell Brass Works, Nagle Engine & Boiler Co., Walker Foundry Co., Erie Foundry Co., Morse Iron Works, Heisler Locomotive Co.

SELLS AMERICAN WAY OF BUSINESS

(*Continued from page* 89)

take over the reigns of industry, finance and the professions. And it is our belief that boys in their late 'teens are at their best and most receptive age for such an experience. We want to emphasize, too, that this move is entirely unselfish and that it is not to be considered as training for positions with this organization. The course is free and there are no obligations. All we expect from the student is sincere interest, co-operation, and ability to profit from the course."

The first course started at the Lehigh plant on July 14, the second on Aug. 4. Each was conducted for five days each week from 9 a.m. to 12 noon. Special instructors conducted the course under the supervision of Merrill Cassebaum, director of extension education, Easton High School. Among the various subjects covered during the course were the following:

Principles Behind Employment—This was intended to give the youthful student an understanding of employment methods and the reasons for them. It included a typical interview—how to fill in an application form; discussions of employer-employee relationship; description of various types of pay including hourly, overtime and typical incentive pay plans.

Following a Customer's Inquiry—For this portion of the course instructors

(*Continued on page* 130)

SHIPMENTS OF CASTINGS

(Reported by Bureau of the Census)

Gray Iron Castings

(Net tons)

	Shipments		Unfilled
	Total	For Sale	*Orders
1946			
Jan.	727,094	453,194	2,096,344
Feb.	571,894	383,315	2,181,809
Mar.	820,111	517,992	2,285,082
Apr.	885,701	542,649	2,430,079
May	782,850	465,038	2,531,095
June	757,268	442,473	2,640,430
July	840,004	487,458	2,708,385
Aug.	973,232	567,164	2,814,430
Sept.	937,401	540,649	2,897,105
Oct.	1,077,838	626,273	2,952,705
Nov.	987,069	561,626	2,940,199
Dec.	909,195	514,415	2,979,658
TOTAL	10,269,657	6,102,246	.....
1947			
Jan.	1,077,820	632,789	3,021,141
Feb.	1,009,970	583,252	2,986,741
Mar.	1,089,828	633,844	2,979,326
Apr.	1,097,150	636,708	2,907,694
May	1,097,307	636,013	2,782,706
June	1,038,356	596,874	2,710,854

* For sale only.

Steel Castings

(Net tons)

	Shipments		Unfilled
	Total	For Sale	*Orders
1946			
Jan.	102,506	77,329	359,527
Feb.	60,604	45,687	387,222
Mar.	104,483	80,851	406,401
Apr.	146,608	107,313	384,653
May	130,844	94,761	374,168
June	121,522	89,533	354,367
July	117,528	82,975	356,799
Aug.	129,666	94,063	373,745
Sept.	126,471	90,567	380,589
Oct.	137,304	98,265	384,082
Nov.	130,606	93,878	372,058
Dec.	123,907	88,136	362,787
TOTAL	1,432,049	1,043,358	.....
1947			
Jan.	139,029	101,140	365,476
Feb.	125,612	92,822	421,405
Mar.	134,909	99,701	434,865
Apr.	144,175	106,127	427,554
May	140,874	103,779	443,225
June	139,031	103,888	445,475

* For sale only.

Malleable Iron Castings

(Net tons)

	Shipments		Unfilled
	Total	For Sale	*Orders
1946			
Jan.	54,016	38,181	245,878
Feb.	40,155	29,326	248,644
Mar.	50,235	33,978	263,227
Apr.	65,010	36,298	267,713
May	62,598	34,975	271,925
June	61,650	35,468	275,845
July	64,446	38,021	271,981
Aug.	67,903	41,345	272,440
Sept.	69,507	39,631	277,309
Oct.	79,207	46,477	280,972
Nov.	68,987	39,328	278,446
Dec.	68,314	39,327	267,661
TOTAL	752,028	452,355	.....
1947			
Jan.	75,898	42,414	259,764
Feb.	74,716	41,684	274,018
Mar.	76,614	43,488	280,724
Apr.	81,890	47,303	275,415
May	75,478	42,294	262,117
June	78,524	45,291	248,798

* For sale only.

Aluminum Castings

(Thousands of pounds)

	Shipments			Unfilled
	Total	Sand	Perm. Mold	*Orders
1946				
Jan.	23,568	9,556	10,131	83,541
Feb.	23,231	11,613	7,866	94,858
Mar.	26,661	10,792	11,305	97,013
Apr.	27,692	11,562	11,010	100,267
May	29,176	11,834	12,228	117,710
June	28,496	11,674	11,767	118,747
July	28,828	10,706	12,213	124,457
Aug.	33,845	12,721	14,309	133,510
Sept.	32,003	12,445	13,045	136,237
Oct.	39,917	14,559	17,311	144,276
Nov.	35,635	13,192	15,440	138,270
Dec.	34,754	12,827	14,586	137,198
TOTAL	353,809	143,481	151,211	.....
1947				
Jan.	39,438	14,030	16,902	131,368
Feb.	35,904	12,936	15,148	128,999
Mar.	40,135	13,791	17,509	121,038
Apr.	39,438	13,633	16,605	112,926
May	37,400	13,646	14,514	112,548

* For sale only.

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments			Unfilled
	Total	Sand	Perm. Mold	*Orders
1946				
Jan.	72,265	65,107	1,886	71,827
Feb.	60,856	56,992	1,713	72,736
Mar.	74,971	66,076	2,353	70,622
Apr.	77,919	71,105	2,390	71,108
May	76,054	70,748	2,453	76,792
June	70,910	66,378	1,755	78,449
July	66,695	62,369	2,339	78,018
Aug.	77,733	72,158	2,376	77,538
Sept.	76,835	71,543	2,415	84,183
Oct.	89,148	83,610	2,559	80,770
Nov.	77,605	72,671	2,159	79,126
Dec.	77,961	73,278	2,122	80,445
TOTAL	898,952	832,037	26,520	.....
1947†				
Jan.	85,783	80,524	2,164	78,874
Feb.	78,729	73,863	2,046	76,016
Mar.	83,195	77,113	2,623	74,422
Apr.	84,196	78,760	2,253	69,392
May	90,054	81,851	4,732	73,550

* For sale only.

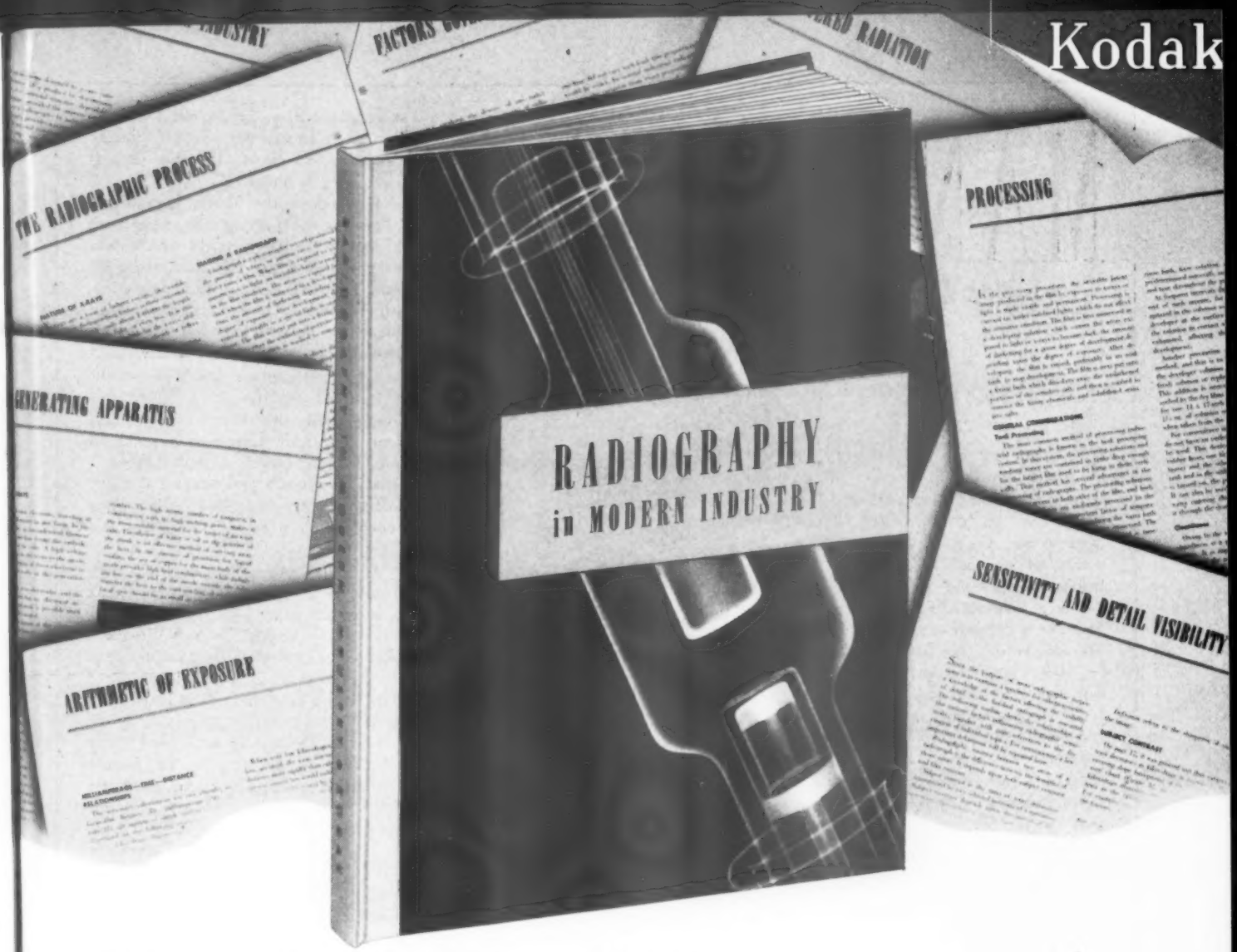
† 1947 figures include copper and copper-base alloy castings.

Magnesium Castings

(Thousands of pounds)

	Shipments			Unfilled
	Total	Sand	Perm. Mold	*Orders
1946				
Jan.	398	349	16	3,114
Feb.	438	366	35	3,338
Mar.	594	525	33	3,484
Apr.	570	465	36	3,297
May	661	587	45	3,778
June	717	623	46	4,063
July	628	477	53	3,986
Aug.	694	568	56	4,234
Sept.	811	676	61	4,096
Oct.	921	733	73	4,219
Nov.	716	574	41	4,294
Dec.	717	635	28	4,599
TOTAL	7,865	6,578	523	.....
1947				
Jan.	809	723	40	4,480
Feb.	707	605	69	3,776
Mar.	677	593	45	3,276
Apr.	627	526	78	3,245
May	628	481	104	3,297

* For sale only.



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MAN-TO-MAN
on the Molder's Bench

"Once in a Blue Moon"

By RALPH L. LEE

I GUESS we all have those days when everything seems to go wrong, but thank the good Lord, every once in a blue moon a day does come along when everything seems to go right. One such day came along for me some time ago.

For a long time I'd been wanting to make a carriage stop for my lathe. My son kidded me about it. "Dad," he said, "you know darn well, you can buy one of those already made, I saw it in the catalog—but I know you—You're just cookin' up an excuse to get up there in the pattern shop and foundry."

I told him in no uncertain terms that I was not, even though I knew he had a point. But just the same I made up my mind to go ahead. I wanted to see whether I couldn't design that stop so I could mold it without any machining except for a few drilled holes.

With my measurements of the lathe bed, the mechanical requirements of the job in mind, together with the pattern and casting problems, I settled down with my sketch pad for a game of chess in designing. Hunch after hunch was played to a stalemate—until finally with the pad almost full, I said to myself, "Boy, that's it."

The nice thing about a one-man plant is that you don't need to call a committee meeting to start a new job, you don't even need to write a note nor do you have to stand in line for patterns or castings. In fact I didn't put dimensions on my layout, just took it up to the pattern shop and started cutting wood.

I took particular pains with the pattern, although I will say that I didn't waste any time. As I worked I could hear my good old Dad say, "It doesn't take any longer, in the long run, to cut to the line than it does over or under it."

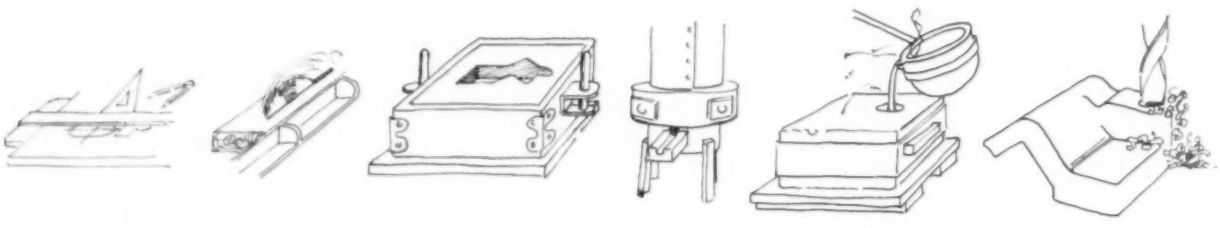
I watched the draft, kept sharp edges on the parting line, rigged up a simple follow board—which was easy to do while the tools were all out. Then I put a fine sandpaper finish on her. Two coats of lacquer made the pattern look just as though it had been molded in bakelite.

After getting my sand just right I rammed up the drag, rolled her over—lifted the follow board and boy, that old parting was good to see. I didn't touch it with a tool. I made two molds and again I thought I heard Pop say, "Why make two when you only need *one*? Make one right."

As I said when I started out, this was one of those days. My metal was right, gates and risers as and where they should be and the castings came out solid with almost a die-cast finish. The castings won't have to be machined, they fit as they are.

I wish there was some way that all the boys working in our foundries could get the kick and the bang I did in seeing a job clear through from the very start. Now that I think of it, it might pay every once in a while, to get the gangs together and take them on an imaginary trip through some job from the drawing board clean through the pattern shop and foundry to the machine shop itself. I guess that we have all got to be very careful lest we organize and economize every last bit of possible fun out of foundry work.

I'm all braced now for a run of those days when everything will at least seem to go wrong.



(*Continued from page* 128)

took the students on a tour of all departments from the time an inquiry is received to the final packing of the merchandise for shipment. Lectures and actual demonstrations covered office procedure, production scheduling, plans and engineering, laboratory analysis and development, foundry operation, mechanical operations in the toolshops, inspection and testing.

A Study of Management—This described the functions and practical application of the organization chart, the place that each management group plays and its relation to each other group, labor relations, employee promotion methods, and the many other problems of management.

Safety Regulation—This covered how modern business protects the health and welfare of its employees, including a discussion of dispensary and compensation laws.

Other subjects treated during the three weeks included advertising and sales planning, accounting methods and credit analysis.

On the last day of the course the boys were given a brief examination on their observations and asked to write a thesis. On the basis of this test a recipient was selected from each group for the awarding of a college scholarship. Both the test and the thesis provided some in-

(*Concluded on page* 132)

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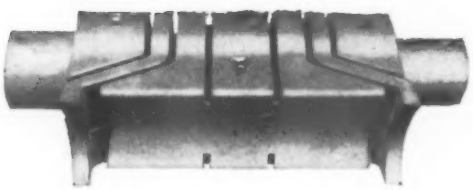

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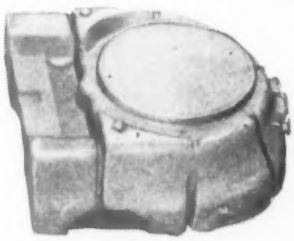

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(*Concluded from page 130*)

teresting results in that the boys apparently got a lot more out of the course than its sponsors had expected. Incidentally, all of those who entered the course completed it.

The company believes that the boys now have a much fuller understanding of how a manufacturing business is conducted, and are in a much better position to interpret the management problems they read about in the daily papers. In addition to accomplishing its objective of selling the American system and way of doing business, the company also feels it has prevented some "square pegs" from getting into "round holes" and vice versa. For example, one boy had planned to start the study of mining engineering at college this fall, but as a result of the course at Lehigh Foundries he became very interested in metallurgy. Subsequently he admitted that his interest in mining engineering had been only superficial, and he now intends to study metallurgy in anticipation of entering the foundry industry.

NEW FOUNDRY IS DISTRICT'S FIRST

THE new Kingsford, Mich., gray iron foundry of Grede Foundries Inc., Milwaukee, opened early this year, is the fifth unit in the parent company's multiple operations developed over a period of 25 years. It is the first foundry to be operated in Dickinson county, Mich., and is a thoroughly modern plant, equipped with the most modern mechanical and technical equipment available and adaptable for the size of the foundry and type of production planned.

Mechanical cupola charging equipment is installed. Twenty-five jolt-squeeze molding machines are in operation. Adequate illumination is provided by the large windows and overhead mercury and fluorescent lighting equipment throughout the plant. An overhead monorail system supports the bull ladles and crane ladles used in transferring the molten metal from cupola to molding floors. Melting capacity of the new foundry is about 30 tons a day. Modern sanitary facilities—lavatories, shower rooms and many other conveniences—have been installed for employees.

The new plant is two modern factory buildings in one. Of 70,000 sq ft available floor space in the building, Grede Foundries uses 40,000 sq ft, and the balance is used by the Lake Shore Engineering Co., a machine shop. It is an arrangement worked out by William J. and Arthur L. Grede, company president and secretary, respectively, with F. A. Flodin and W. B. Thompson, president and vice president of Lake Shore Engineering, to facilitate the production of castings in a single, correlated operation, eliminating the delay in shipping castings from foundry to machine shop.

Because the new foundry employees, drawn from the Kingsford-Iron Mountain, Mich., area, were not experienced in foundry work, the company conducted a training program with H. P. "Pete" Kreulen, a vice president of the firm, heading a staff drafted from the company's Wisconsin plants. This group of veterans assisted the new foundry's permanent staff in beginning operations.

In the accompanying illustrations a general view of the molding floor is shown at the left. At right, Mr. Kreulen demonstrates how to pour a mold correctly.

Nonferrous Founders To Meet Oct. 17

Annual meeting of the Non-Ferrous Founders' Society will be held at the Hotel Continental, Chicago, Oct. 17. A special program covering subjects of particular interest to the nonferrous foundry industry is being planned.

On July 28 the board of directors of the society met in New York and elected Chester K. Faunt, Christensen & Olsen Foundry Co., Chicago, as president, succeeding the late Thomas L. Hemenway. The board accepted the resignation of L. M. Nesslebush, Falcon Bronze Co., Youngstown, O. as vice president, and elected William A. Gluntz, Gluntz Brass & Aluminum Foundry Co., Cleveland to the unexpired term. Mr. Nesslebush resigned as an officer of the society because of illness. Both Mr. Faunt and Mr. Gluntz will hold office until the annual meeting of the board of directors on Oct. 17.

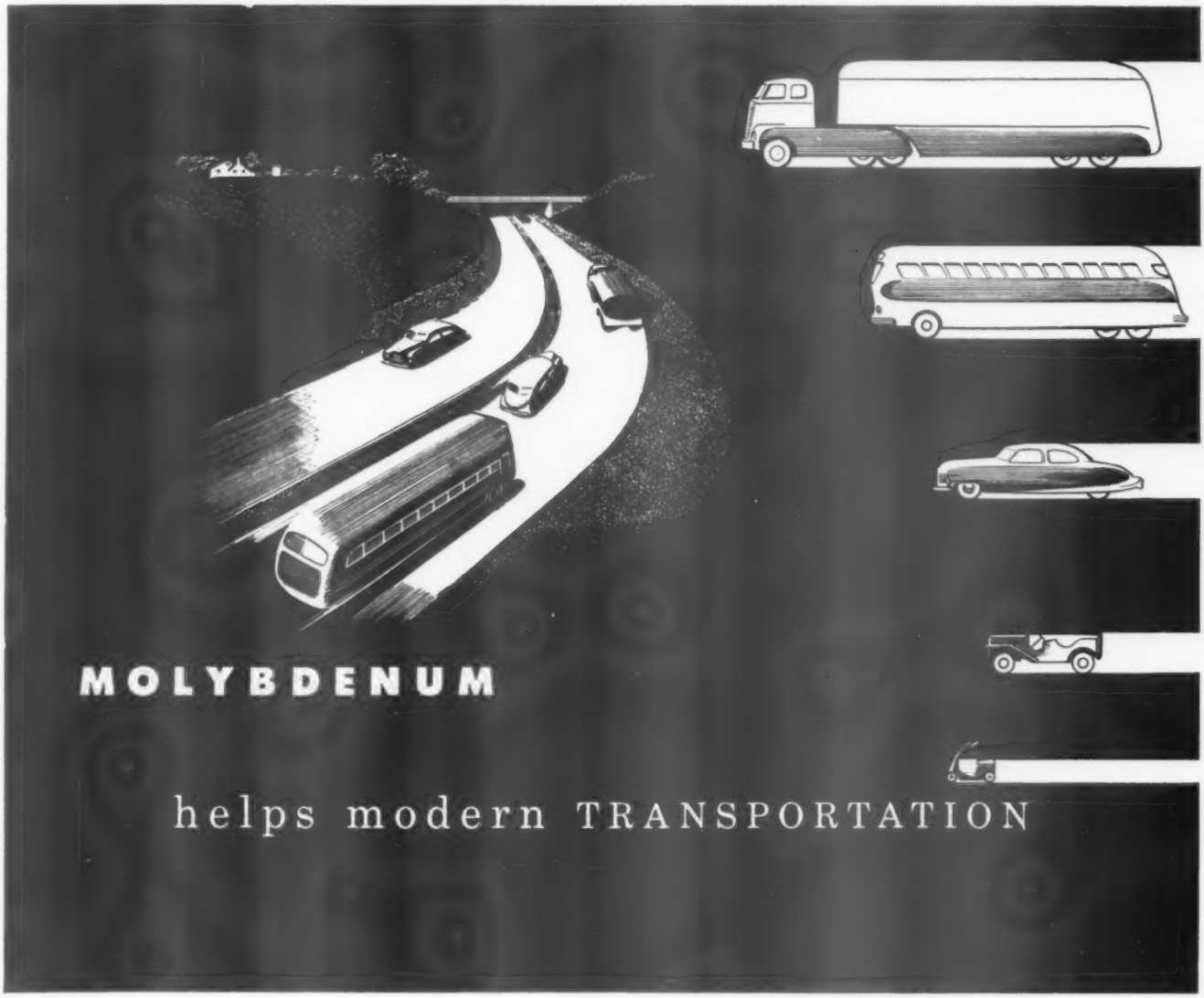
Book Review

"Directory of Member Institutions and Review of Current Research," compiled by John I. Mattill, paper, 103 pages, 6 x 9 in., published by the Engineering College Research Council, State University of Iowa, Iowa City, Iowa. Price $1.

Member institutions of the Engineering College Research Council are listed alphabetically with the institution's address, research director and officers, research policies, research personnel, research expenditures during the preceding year, projects now active and those scheduled before 1948. Council committee members are listed, and the council's by-laws are printed at the end of the book.

English Exhibiting Foundry Equipment

First showing of foundry equipment held in England in 10 years will be in conjunction with the Engineering and Marine Exhibition, in London, Aug. 28-Sept. 13. Foundry Trades' Equipment and Supplies Association, 94/98 Petty France, London Southwest 1, is sponsoring the exhibit of foundry equipment and supplies.



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RADIOGRAPHY HAS ROLE

In Developing Foundry Practice

By ROBERT G. WAITE

THE modern foundry is a far cry from the crude iron smelter of ancient man, but inventions, improvements in the art, and control (which have been to a large degree responsible for the advancement of the art) still point the way for future progress. Radiography is one of the useful tools which permits complete nondestructive examination of the product and thus is a great aid in developing foundry practice and control which result in better castings produced at reduced costs.

A few skilled craftsmen such as the patternmaker or the engineering draftsman can translate the dimensions of breadth, width, and depth of a blueprint to a mental picture of the proposed casting. A small scale model of wood (or stiff paper in some cases) is an invaluable aid to the foundry superintendent or planning engineer. While playing with wood models may seem far removed from a foundryman's duties it enables him to orient the proposed casting so that the best combination of risering, gating, and positioning in the mold is determined. The use of a model also permits the application of the proper foundry practice so that the laws of directional solidification are followed.

The foundry practice for the pilot casting as determined by the foundry superintendent, planning engineer or planning committee after their study of the model, is then indicated on the blueprint or engineering drawings. The location, sizes and types of risers and gates, type and location of chills, sand mix to be used, and other details of foundry practice are recorded. A system of records such as this, is essential to the jobbing foundry where reorders may occur at irregular intervals.

The patterns and coreboxes incorporating the foundry practices thus established are manufactured. When the pattern equipment is completed, the radiographer should make a thorough check on the coremaking and molding practice. The condition of the cores, location of chills, if any, and the condition of the mold should be observed before the mold is closed. The radiographer should also be present when this pilot casting is poured so that the pouring temperature, rate of pour, and any conditions which might influence the results are observed. Radiography is also utilized when bottom-pour ladles are used, as an inspection of the clay-graphite ladle stopper heads (see THE FOUNDRY, September, 1944). Pouring difficulties arising from leaky stoppers' are avoided by this practice.

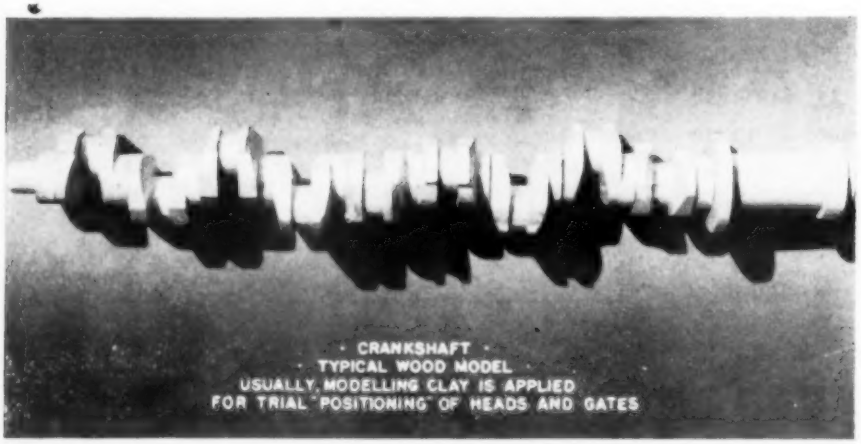
After the casting has been "shaken out" from the mold and rough cleaned, visible defects such as hot tears or sand inclusions may be investigated. Radiography may be used at this point to determine the severity of the defect and thus allow a more rational decision as to whether the casting should be scrapped or salvaged. In most cases no major defects are present and the casting is cleaned; heads and gates are removed, and the casting is chipped and sand or shot blasted.

A complete radiographic examination of the pilot casting is then made using proper film, penetrameters, and radiographic technique for the thicknesses examined. A round-table discussion or conference is then held, at which time the radiographic results are considered. The works manager, foundry superintendent, metallurgist, planning engineer, radiographer, designer, and possibly the customer take part in this discussion to decide whether the results are satisfactory or whether possible changes in practice and further improvements can be made.

The designer, whenever possible, should be included in this conference since often the foundry technique and production of good castings can be vastly improved by a slight change in design. Whole-hearted co-operation from all members of the group is essential in the development of a good foundry practice.

All changes in practice agreed upon by the planning group are noted on the blueprint record. Such changes as size or position of risers or gates, addition of padding, use of chills, change of position, tilting the mold, change of design are thus recorded. A second pilot casting is then cast and the procedure outlined above is repeated. Usually one or two pilot castings are sufficient to produce a successful casting; occasionally more are needed. Unless there is an extreme urgency this system of pilot castings and check by radiography should be followed in order that quality castings at low costs can be produced.

As the job moves from the pilot to the production stage, a complete history of the casting should be compiled. Information such as name of casting, pattern number, serial, heat number, order of pouring in the heat, pouring temperature, and radiographic results should be recorded. A summary of defects and the changes made to eliminate them also should be included.



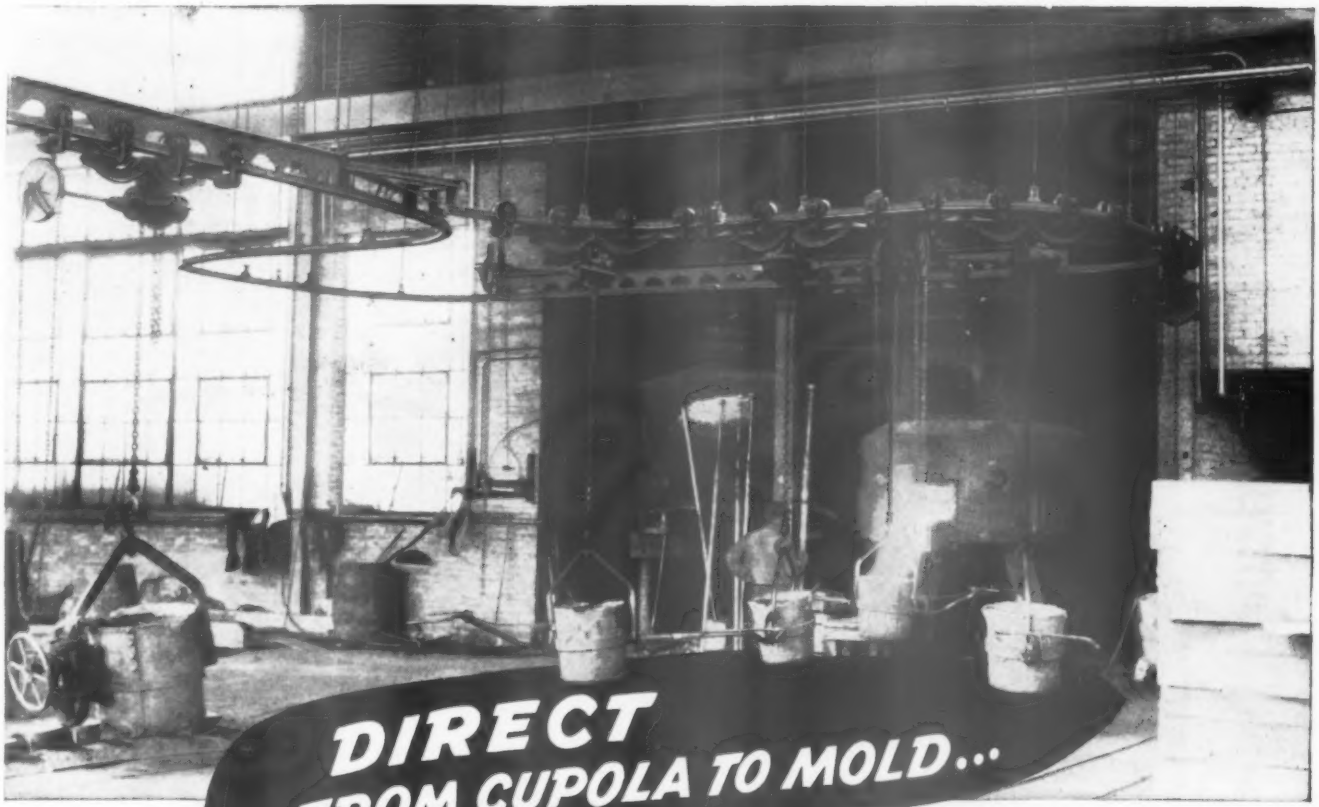
CRANKSHAFT
TYPICAL WOOD MODEL
USUALLY, MODELLING CLAY IS APPLIED
FOR TRIAL "POSITIONING" OF HEADS AND GATES

Book Review

Radiography in Modern Industry, plastic coated board, 122 pages, 8½ x 11 inches, published by Eastman Kodak Co., Rochester 4, N. Y. Price $3.

Prepared by members of Eastman Kodak Research Laboratories and the firm's Industrial X-ray Division this volume presents an up-to-date authoritative treatment of industrial radiography. Divided into 16 sections its content is arranged to meet the needs of the professional worker as well as the student reader. Beginning with a discussion of radiography's place in industry the text describes the process, x-ray generating equipment and geometric principles.

Information on the factors governing exposure is given as well as that on radiographic screens. Scattered radiation and methods of reducing it to a minimum are described. Methods of obtaining proper exposure are discussed, and procedures for securing the desired sensitivity and detail visibility are presented. Special techniques such as microradiography, fluoroscopy, photoradiography, high-speed radiography, determination of depth of defect, and x-ray diffraction are described. Other topics discussed include industrial x-ray film, processing, processing room, sensitometric characteristics, protection, and unsatisfactory radiographs. Book concludes with bibliography and an excellent index.



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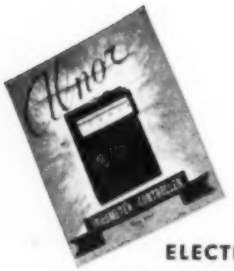

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Recommendations for Handling

PERSONNEL PROBLEMS

By W. J. BARCLAY

FEW FOUNDRY managements accept materials for fabrication without definite laboratory or other tests. This assures the buyer that the material will give the desired results. In contrast, many managements employ all types of manpower with no thought of the necessity for a thorough physical preplacement examination to determine whether the prospective applicant is fit and capable of doing the work for which he is being hired. Peculiar as it may seem, in those plants where preplacement physicals are required waivers for examination often are granted to executive personnel. In the writer's opinion this should not be permitted because that type of employee is under far greater mental strain and his physical condition should be known to both himself and his prospective employer.

Examination Pays Dividends

Following his acceptance into the organization every employee should be re-examined periodically to determine his physical reaction to his occupation. Physically fit personnel will be found to be safe, steady and productive workers. Future production results will prove that the cost of the pre-placement as well as the re-examinations has paid real dividends.

When a company has an abundance of help seeking employment, nothing is more discouraging than to be greeted with a "No Help Wanted" sign. It is always a good investment to give the applicant a moment or two and suggest that he fill out an application for future possible use. These few moments of your time will greatly encourage the applicant and at a later date when you do need his services he will be more than willing to respond to your notice to report.

Too much emphasis cannot be given to the necessity for the proper selection of all personnel. Following the applicant's selection, physical examination and employment write-up, and prior to his being escorted to his place of employment for introduction to his supervisor, it is time and money well spent to have someone sit down with the new employee or group of employees and tell what the company has to offer. Explain what the company expects of them in the way of effort and attendance, what the company offers them in the way of employee service such as group insurance, hospitalization, credit union, vacation plan, etc. Tell them your method of promotion or how they can increase their earnings. Tell them what are the various shift hours, which is pay day, and the period the pay day covers. Tell them when they are to take their lunch period and what feeding facilities you offer.

Explain your working standards and your safety regulations and why you have them. If you are working under a union contract see that they have a copy and urge them to read it, impressing upon them the necessity for following out the written agreement. Invite them to bring their problems to the personnel office for assistance. A good selling job at the beginning will leave a lasting impression.

On separations be sure there is an exit interview. It may surprise you why employees leave your service and if you don't know the reason, how can you correct it? If you have a sufficient number of veterans in your service, assist them in securing their own Veteran Organization Charter. If not, at least arrange for a monthly progress report covering each veteran, recently returned from service, these reports, to be continued for the period of at least a year. Most union contracts carry a probationary period. Be certain probationary employees are checked at short intervals during their probationary period to determine whether or not they are going to fit into your organization.

Have a shop paper that is full of news and pictures about the employees and their activities. Have the company represented in baseball, basketball and bowling. If possible have a shop band for employee benefit and to assist in community affairs. Arrange dances and have an annual employee basket picnic. Also, have an annual employee theatrical. It will surprise you how much real talent you have in your own organization. Employees like to brag about the things you give them as compared to the other shops in your town. This kind of bragging cannot be bought for any amount of money. It shows that your employee service program is sound.

Be certain you have complete up to the minute employment records. Records are very important in every department, especially in your labor discussions, so don't fail to keep written records of all bargaining meetings, disciplinary actions, or posted notices. Don't try to carry in your mind information that should be down on paper.

By your own choice your foreman is your representative in his department. Educate him so that he can follow out your desires intelligently. Give him more than a title. See that his wage rate is correct and see that he thoroughly understands your labor contract. Meet with him weekly and be certain that any announcements you are going to make are made to him first. Take him out to dinner occasionally and if you have enough foremen organize a Foreman's Social Club. Build him up. If he is your *key man*, keep him polished up, happy, and proud of his job. By the same token don't let him "pass the buck" and have you do the job for him.

In closing might I state that inasmuch as most of our wakening hours are spent on our jobs, the happier we are the more we like the job. If we like our job, it is far easier for us to produce. Man makes machines but machines must still be serviced by man so keep him happy in his work and he will thrive on what he "gripes" about the most.

To Meet in Glasgow

Annual autumn meeting of the Institute of Metals (London) will be held in Glasgow, Scotland, on Sept. 23 to 26, at the House of the Institution of Engineers and Shipbuilders in Scotland. Papers to be presented for discussion at the technical sessions include: "Centrifugal Casting of Copper Alloy Wheels in Sand Molds," by Dr. O. R. J. Lee and Dr. L. Northcott; "Surface Effects During the Annealing of 70:30 Brass," by J. W. Jenkins; "Frictional Properties of Some Lubricated Bearing Metals," by P. G. Forrester; "Metallographic Study of the Precipitation of Copper from a Silver-rich Copper-silver Alloy," by Dr. Marie L. V. Gayler and E. Carrington; and a discussion of papers on the "Corrosion of Magnesium Alloys."

During the two-day session, afternoons will be devoted to plant visitations to British Aluminum Co. Ltd., Falkirk; John Brown & Co. Ltd., Clydebank; Glenfield & Kennedy Ltd., Kilmarnock; Henry Wiggins & Co. Ltd., Thornliebank; Albion Motors Ltd., Scotstoun; Babcock & Wilcox Ltd., Renfrew; and Barr & Stroud Ltd., Anniesland.

Tensile Strength Computer

W. C. Dillon & Co. Inc., 5410 West Harrison St., Chicago 44, has developed a tensile strength computer for determining the relation between specimen size, breaking strength and psi. The computer covers rectangular specimens from 1/32 to ¼ in. thick by ½ to 1½ in. wide, from 0 to 150,000 psi. Reverse side covers rounds from 1/16 to 1 in. diam, up to 100,000 psi. The computer is available to engineers and school professors upon request.

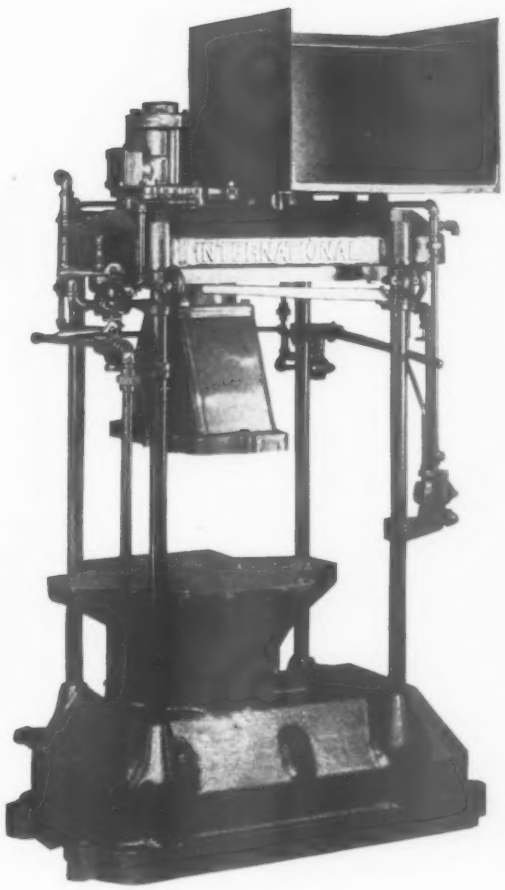
Sand Blowers by

INTERNATIONAL MOLDING

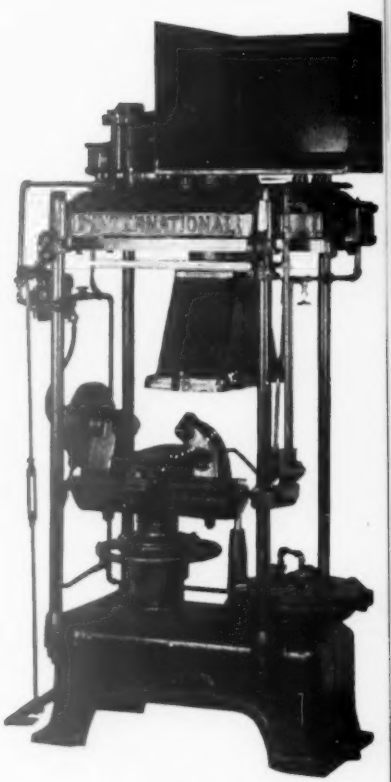
LA GRANGE PARK,

INTERNATIONAL

Type SB 13 — Sand Blower, adapted especially for horizontally split boxes of medium size, but larger than can be handled by the SB 11 machine. May be had with the roll-out feature for ease in handling large core boxes. (Side clamps and vibratorially agitated hopper available as extra features.)



Type SB 11 — For medium sized cores with air clamp and draw feature. (Side clamps, rollers, vibratorially agitated hopper are all available as extra features.



Type SB 10—Sand Blower, adapted especially for medium size split boxes. Side clamps are standard equipment. (Vibratorially agitated hopper is available as an extra feature.)

A COMPLETE LINE OF SAND BLOWERS

The possibilities in the use of INTERNATIONAL SAND BLOWERS in the Core Room and Foundry are very extensive and with the proper pattern set-up and the International "know-how" many industry problems become greatly simplified.

WRITE FOR ILLUSTRATED BROCHURE ON INTERNATIONAL SAND BLOWERS

MACHINE COMPANY

SUBURB OF CHICAGO **ILLINOIS**

Activities of Foundry GROUPS

Northeastern Ohio

APPROXIMATELY 200 members and guests attended the summer outing of the Northeastern Ohio Chapter of the AFA, held at Pine Ridge Country Club near Cleveland, July 11. The event marked the revival of the chapter's annual outings, which had been suspended during the war years. In charge of arrangements were Henry J. Trenkamp, retiring president, L. P. Robinson, entertainment committee chairman, and Leon F. Miller, chapter director.

Rain put in a brief appearance but failed to prevent a large number of golfers from completing an afternoon round. Horseshoe pitching and swimming also preceded the athletic climax of the afternoon—the softball game between the foundrymen and the vendors. For the first time in the chapter's history the vendors captured the perpetual trophy—a miniature cupola—by the convincing score of 22-11. F. Ray Fleig and Ray Crosby, both of Smith Facing & Supply Co., Cleveland, were manager and captain, respectively, of the vendor's team. George Leroux, National Malleable & Steel Castings Co., Cleveland, directed the foundrymen and also served as official scorekeeper.

An enjoyable dinner in the clubhouse was followed by the distribution of numerous golf and door prizes.—*Robert H. Herrmann.*

Cincinnati

EIGHTH annual spring party of the Cincinnati District Chapter of the AFA was held June 17 at Clovernook Country Club, with about 260 members and guests in attendance. The party was one of the largest the chapter has had and was voted a huge success. The golf course was full from noon until dinner time and the ground around the horseshoe stakes took a beating. The ball game was called at the end of the fourth inning on account of rain but the winning team members each received a case of beer. The usual games were played after the dinner.

The chapter will resume monthly meetings in September.—*E. F. Kindinger, Williams & Co.*

Texas

ANNUAL business meeting of the Texas Chapter of the AFA was held June 20, at the Golfcrest Country Club, Houston. Chairman William Ferguson opened the meeting with introduction of visitors. A review of programs for the year disclosed that half of the speakers for the eight technical meetings had been obtained from local sources and half were out-of-state and national celebrities.

Reading of the plaque to be presented to the family of L. H. August, a deceased member of the chapter, was made by Chairman Ferguson. It was also decided that a similar plaque be presented to the family of C. W. Trout of the Lufkin Foundry & Machine Co., who died recently.

Officers elected to serve the chapter for the year 1947-48 were announced

(*Continued on page* 143)

SUMMER OUTING of the Northeastern Ohio Chapter, AFA brought out some 200 members and guests. Photos by Sterling Farmer, Sand Products Corp., Cleveland

Foundry management, watching mounting costs, sees profits in MOGUL. This perfect Green Bond makes money because it decreases drying time, yields smooth cores and reduces discards. MOGUL works profitably with pitch or resin because cores can be handled warm. For both green and dry strength use MOGUL in cores.

KORDEK is an equally perfect Dry Bond. Used in smaller quantities than most dry binders, KORDEK produces better quality castings with fewer discards.

CORN PRODUCTS SALES CO. • 17 BATTERY PLACE • NEW YORK 4, N. Y.

LET US PROVE TO YOU THAT THESE TWO PRODUCTS CAN SAVE YOU MONEY

VITROSEAL
Born in Fire

A Whitman Company Product Formerly Sold Under the Name "Vitrobond". Identical in composition and quality.

A TESTED AND PROVED PRESERVATIVE TREATMENT THAT EXTENDS THE LIFE OF REFRACTORIES AND CRUCIBLES

VITROSEAL actually unites with the brick and forms a semi-glazed protective monolithic wall of from 8.5 to 9 diamond hardness. Not just another coating or wash but a self-vitrifying refractory preservative for high temperature furnaces, fire boxes, and crucibles.

Our new literature explains in detail how and why VITROSEAL can save you money. We suggest you write at once for this important information and for the name of your nearest dealer.

VITROBASIC
Born in Fire

SAVES IRON CUPOLAS AND LADLES

Here is another Whitman product that prevents brick deterioration, reduces patching to a minimum, facilitates slag removal and increases operating efficiency. VITROBASIC is a highly refractory basic, self-vitrifying coating with magnesium oxide base. VITROBASIC is particularly recommended for use in iron cupolas, on gannister rammed and brick-lined ladles and is highly efficient for use on crucibles and furnaces used in melting aluminum and magnesium alloys. Many other uses.

There is new literature on the How and Why of VITROBASIC too, send for it today.

THE WHITMAN COMPANY

1407 ESPERANZA ST.

LOS ANGELES 23, CALIFORNIA

(*Continued from page* 140)

and include the following: Chairman, M. W. Williams, foundry manager, Hughes Tool Co., Houston; vice chairman, Jake Dee, owner, Dee Brass Foundry, Houston; and secretary, Harry Wren, sales representative, R. Lavin & Sons Inc., Houston.

New directors include: C. R. McGrail, president, Texaloy Foundry Co., San Antonio; Joe Wolf, owner, Wolf Pattern Works, Houston; H. L. Roberts, vice president, Oil City Iron Works, Corsicana; and C. W. Williamson, vice president, Trinity Valley Iron & Steel Co., Fort Worth.

A resolution was made that a committee be appointed to arrange for a joint meeting with the Tri-State Chapter.—*W. H. Lyne.*

PAST PRESIDENTS: Some of the presidents of the Northeastern Ohio Chapter, AFA, shown at the chapter's Old Timers and Past Presidents Night meeting. Left to right: A. C. Denison, Fulton Foundry & Machine Co.; Walton L. Woody, National Malleable & Steel Castings Co.; Frank G. Steinebach, *The Foundry*; James G. Goldie, M.B.M. Foundry Inc.; John H. Tressler, Hickman, Williams & Co.; Ernest F. Hess, Wadsworth, O.

Chicago

APPROXIMATELY 950 members and guests of the Chicago Chapter of the AFA attended the annual stag outing and golf at the Lincolnshire Country Club, Aug. 9, near Crete, Ill. While the attendance fell about 200 short of equaling last year's all-time high of 1150, the occasion suffered not in the least.

An ideal summer day, with a temperature in the eighties, proved ideal for every activity. A good number participated in the main attraction—golf. For those choosing to take their recreation more conservatively, there were horseshoe and weight guessing contests, as well as exhibitions of boxing and wrestling.

A chicken dinner was served in the Big Tent at 7 p.m. This was followed by the award of a generous number of sports and door prizes. A floor show concluded the evening.

The outing was arranged and directed by the Chapter's entertainment committee. N. L. Mooneyham, sales manager, Core Oil Division, Velsicol Corp., was chairman, and Harry E. Cullen, director of recreation, South Works, Carnegie-Illinois Steel Corp., was secretary.

Other members of the committee were: M. H. Beatty, Hill & Griffith Co.; John J. Behen, National Carbon Co.; Oscar Blohm, Triangle Foundry Co.; R. H. Burnell, Federal Foundry Supply Co.; G. E. Cramer, American Manganese Steel Division, American Brake Shoe Co.; E. Cullinan, Western Foundry Co.; J. C. Day, American Steel Foundries; John Fienning, Chicago Hardware Foundry Co.; F. E. Fisher, Hydro-Blast Corp.; G. P. Fisher, Whiting Corp.; F. B. Flynn, S. Obermayer Co.; H. A. Forsberg, Continental Foundry & Machine Co.; J. C. Gore, Werner G. Smith Co.; L. G. Gustafson, Continental Foundry & Machine Co.; E. E. Henry, Hammond Brass Works; R. M. Jones, Carnegie-Illinois Steel Corp.; C. C. Kawin, Charles C. Kawin Co.; G. S. Kennelley, General Re-

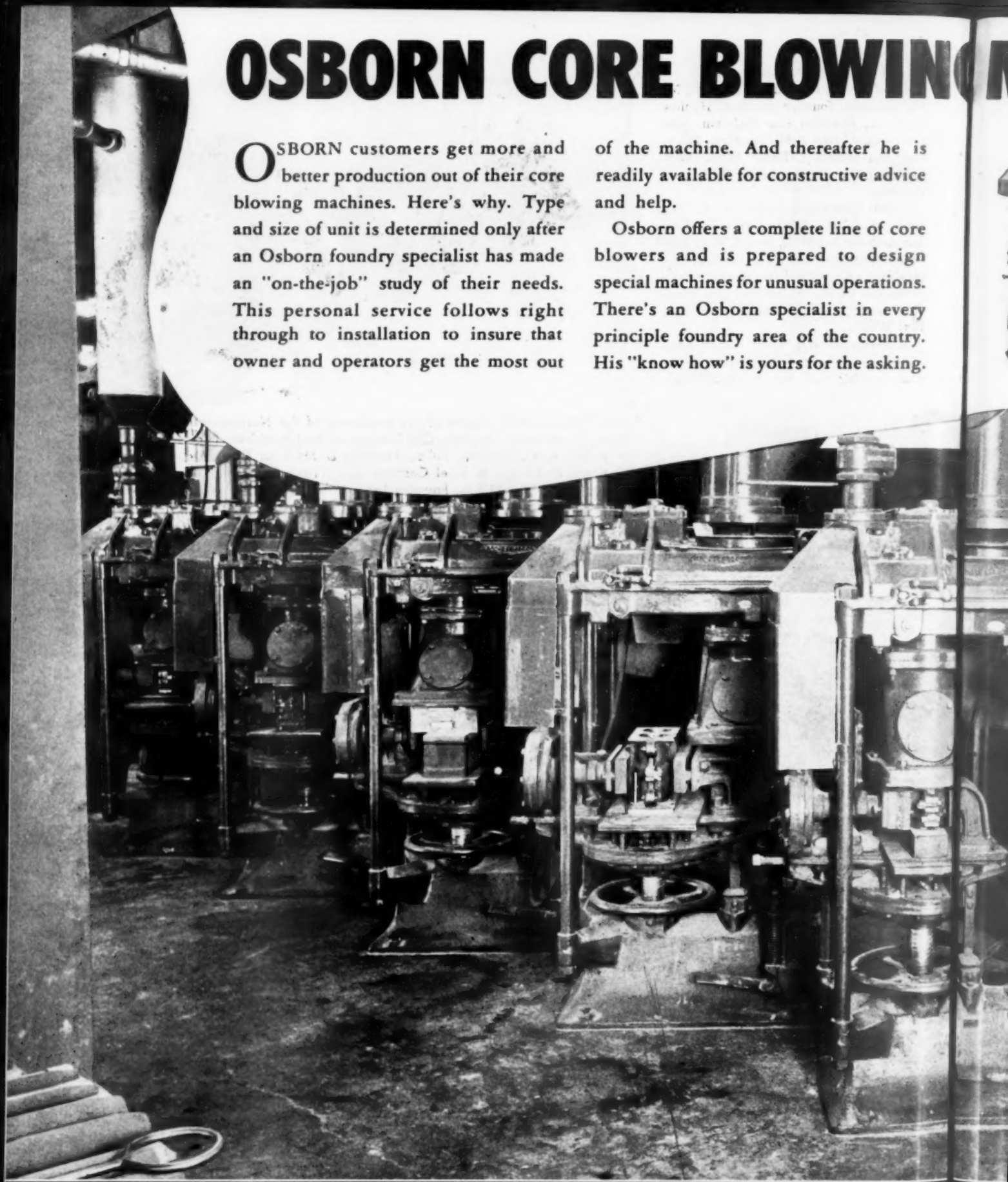
(*Continued on page* 146)

CHAPTER CHAIRMEN: Participants in the fourth annual meeting of AFA chapter chairmen held recently in Chicago

OSBORN CORE BLOWIN

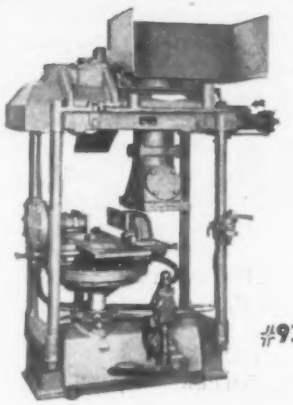
OSBORN customers get more and better production out of their core blowing machines. Here's why. Type and size of unit is determined only after an Osborn foundry specialist has made an "on-the-job" study of their needs. This personal service follows right through to installation to insure that owner and operators get the most out of the machine. And thereafter he is readily available for constructive advice and help.

Osborn offers a complete line of core blowers and is prepared to design special machines for unusual operations. There's an Osborn specialist in every principle foundry area of the country. His "know how" is yours for the asking.



THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

MACHINES ARE SOLD AND SERVICED BY MEN WITH FOUNDRY *"KNOW HOW"*



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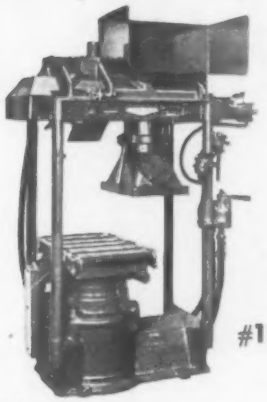

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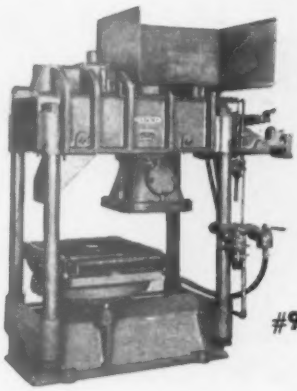

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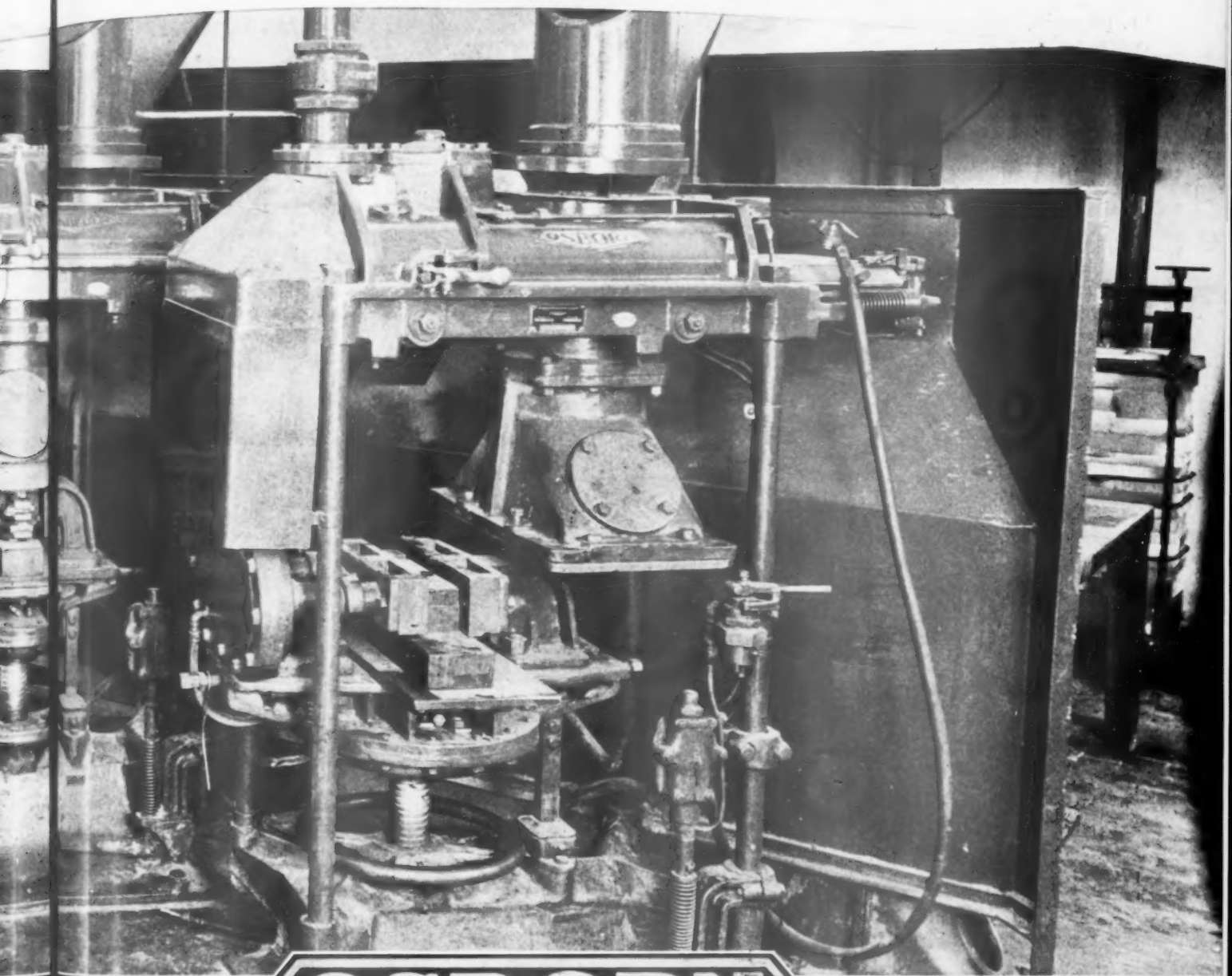
Above are three of the many types



OSBORN

MOULDING MACHINES

CORE BLOWING MACHINES

MEMBER MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

SOUTHERN CALIFORNIA Chapter of the AFA assembled its past presidents for this group scene at a recent meeting. Left to right: Robert Gregg, Albert G. Zima, James E. Eppley, B. G. Emmett, Earl Anderson, Walter F. Haggman, William D. Bailey Jr., Robert R. Haley, William D. Emmett

(*Continued from page* 143)

fractories Co.; G. A. Lillieqvist, American Steel Foundries; R. A. Lindgren, Wisconsin Steel Division, International Harvester Co.; A. V. Magnuson, Champion Foundry & Machine Co.; T. J. Magnuson, J. S. McCormick Co.; S. E. McGinty, Firegan Sales Co.; J. Monroe Sr., Whiting Corp.; W. W. Moore, Burnside Steel Foundry Co.; G. A. Murphy, Edward S. Christiansen Co.; A. S. Nichols, Illinois Clay Products Co.; B. A. Patch, Ohio Ferro-Alloys Corp.; A. J. Peterson, Apex Smelting Co.; O. E. Peterson, Foundry Supplies Co.; H. J. Pfeiffer, Electro Metallurgical Sales Co.; L. D. Pridmore, International Molding Machine Co.; E. H. Pritchard, Western Materials Co.; F. G. Schaub, Calumet Steel Castings Corp.; A. K. Sanderson, Love Bros. Inc.; E. W. Smith, Western Materials Co.; H. C. Swanson, Arrow Pattern & Foundry Co.; H. K. Swanson, Swanson Pattern & Model Works; and C. P. Wright, American Brake Shoe Co.—*Erle F. Ross.*

Northern Illinois and Southern Wisconsin

ANNOUNCEMENT has been made of the following officers elected to serve the Northern Illinois-Southern Wisconsin Chapter of the AFA for the year 1947-48: Chairman, John T. Clausen, metallurgist, Greenlee Bros. & Co. Rockford Ill.; vice chairman, Herbert J. Baumar, factory manager, Ebaloy Inc., Rockford; secretary, Lester C. Fill, foundry superintendent, George D. Roper Corp., Rockford; treasurer, John N. Johnson, J. I. Case Co., Rockford.

Directors of the chapter include: O. W. Josephson, S. Obermayer Co., Rockford; Gunnard A. Johnson, Beloit Iron Works, Beloit, Wis.; R. W. Mattison, Mattison Foundry, Rockford; John A. Forbes, Gunite Foundries Corp., Rockford; John R. Cochran, J. I. Case Co., Rockford; Leon Hull, Beloit Foundry Co., Beloit; John W. Rundquist, Beloit Castings Co.; Bruce Whiting, Woodmanse Mfg. Co., Freeport, Ill; and John Doerfner Jr., Gunite Foundries Co., Rockford. —*John T. Clausen, chairman.*

Northwestern Pennsylvania

THE following committee chairmen have been appointed by Chairman John Clarke to serve the Northwestern Pennsylvania Chapter of the AFA, for the year 1947-48:

Speaker Program Committee—Chairman, Erie, Pa., meetings, J. S. Hornstein, Meadville Malleable Iron Co., Meadville, Pa.; Chairman, Dunkirk, N. Y., meetings, J. M. Morrison, U. S. Radiator Co., Dunkirk, N. Y.; Chairman, Oil City, Pa., meetings, Tom Beaulac, Chicago Pneumatic Tool Co., Franklin, Pa.; Chairman, Sharon, Pa., meetings, J. Douglas James, Cooper Bessemer Co., Grove City, Pa.

Membership Committee—Bailey Harrington, Hickman, Williams & Co., Erie,

(*Concluded on page* 149)

TOLEDO: Scenes at the fifth annual picnic of the Toledo Chapter, AFA. Photos by S. N. Farmer, Sand Products Corp.

MILWAUKEE FOUNDRY EQUIPMENT CO.

Presents

WORLD PREMIER

MILWAUKEE-TACCONE

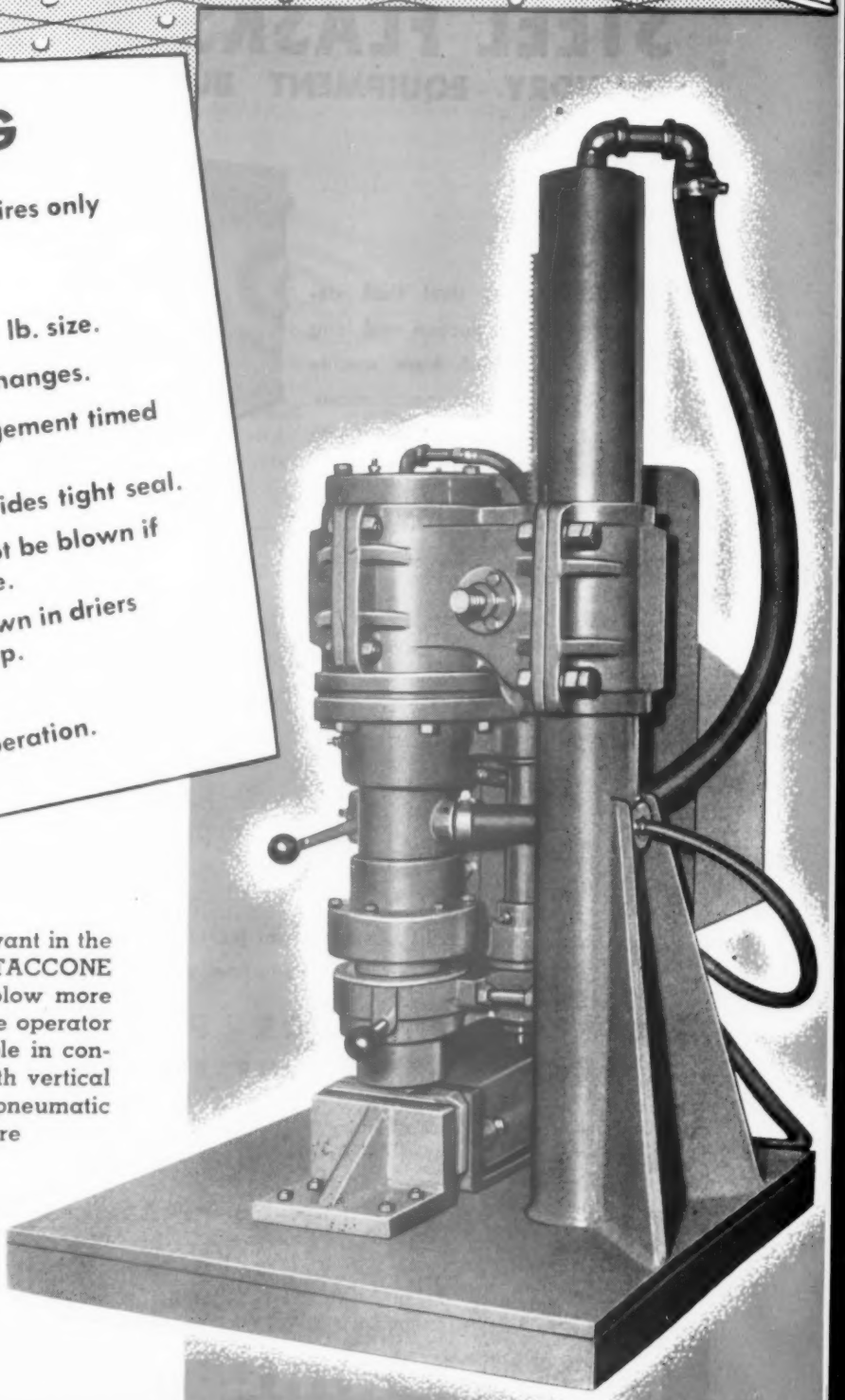
MILWAUKEE

BENCH TYPE

CORE BLOWER

FEATURING

- Explosion type action . . . requires only small line of air.
- No manual labor required.
- Blows better cores, up to 2½ lb. size.
- New sand carrier for quick changes.
- Vise design has cam arrangement timed with mechanism.
- Compensating flange provides tight seal.
- Safety feature: Sand cannot be blown if sand carrier is not in place.
- Cores that are usually blown in driers can be blown standing up.
- Low maintenance cost.
- Less box wear, faster operation.



It's new! It's different! It meets a long felt want in the Foundry industry! The new MILWAUKEE-TACCONE Bench Type Core Blower is designed to blow more intricate cores, and blow them as fast as the operator can remove them from the core box. Simple in construction, the machine is equipped with both vertical and horizontal automatically operated pneumatic clamps. The core box is clamped and the core blown all in one operation by means of a single hand valve. Standard 90 to 110 lb. line pressure is used and the air gets there instantly. The Blower handles ALL types of core boxes, either boxes blown vertically or horizontally, or one piece boxes blown directly on the drier plates.

MILWAUKEE *Foundry Equipment Co.*

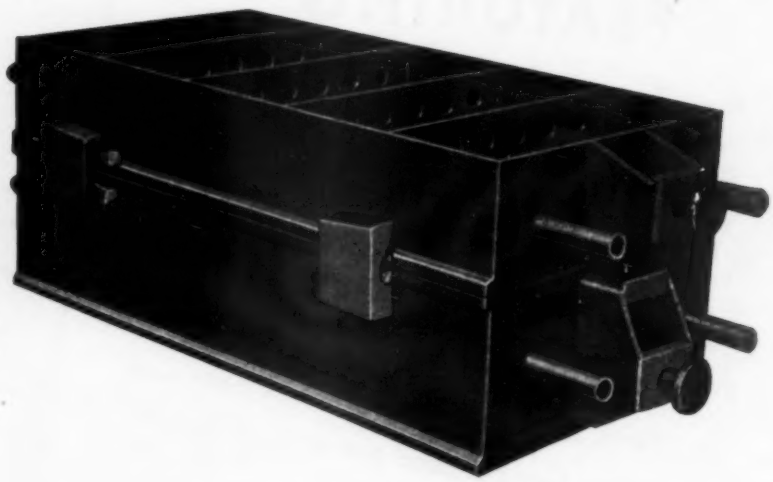
3238 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

Order "Industrial"
Get Prompt Delivery!

ON

STEEL FLASKS & SLIP JACKETS

FOUNDRY EQUIPMENT BUILT STRONGER TO LAST LONGER



● An all-welded steel flask designed for production and long life. Fabricated from quality materials to your specifications. Sand strips top and bottom with parting line surface ground for accurate fit.

● All sizes and modifications of above construction available. Let "Industrial" engineers help solve your problems of unique conditions, special shapes and sizes.

● Accurate and durable heat resistant jackets built of steel to last through long production schedules.

WRITE, WIRE, OR PHONE YOUR INQUIRIES TO YOUR DISTRICT SALES REPRESENTATIVES

SERVING—NEW ENGLAND—NEW YORK—NEW JERSEY—EASTERN PENNSYLVANIA
WILSON INDUSTRIES
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INDUSTRIAL FABRICATING, Inc.

TELEPHONE 6781

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(*Concluded from page* 146)

Pa. Attendance Committee—R. J. Harding, Pickands Mather & Co., Erie. Entertainment Committee—James J. Farina, American Sterilizer Co., Erie. Technical Education Committee—Fred Eisert, Urick Foundry, Erie. By-laws Committee—Clarence Fitz, Hays Mfg. Co., Erie.

Technical Development Committee—Roger Carver, Standard Stoker Co., Erie. Publicity and Chapter Reporter Committee—Earl M. Strick, Erie Malleable Iron Co., Erie. Reception Committee—Clyde Cooper, Keystone Brass Co., Erie. Chapter Photographer, Chester Gleba, General Electric Co., Erie. Top Management Committee—R. W. Britton, Urick Foundry Co., Erie.

Meetings will be held again this year in the Blue Room of the Moose Club, Erie, on the fourth Monday of the month. N. J. Dunbeck, Eastern Clay Products Inc., will be the speaker at the first meeting, Monday, Sept 22.—*Earl M. Strick, Erie Malleable Iron Co.*

Central Illinois

SECOND annual picnic and clam bake of the Central Illinois Chapter of the AFA was held June 21, at the Steak House, Peoria, Ill., and was attended by 200 hungry and thirsty foundrymen. Free refreshments, golf, and other games with prizes were among the attractions, followed by a dinner including baked clams, chicken, etc.—*G. H. Rockwell, Caterpillar Tractor Co.*

Wisconsin

TWELFTH annual foundry outing was held by the Wisconsin Chapter of the AFA, July 18, at the New Ozaukee Country Club, near Milwaukee, with about 715 foundrymen and supply men in attendance. Golfers totaled 207, with some of the enthusiasts starting the game about 9 a. m. and many joining them in the afternoon.

It started off as a hot day, but was exceptionally cool later, with rain appearing after 4 p. m. Some players, with an eye to the prizes, were seen playing in the rain on the way to the 19th hole, but scores of unfinished rounds were "equalized" before distribution of the prizes.

No exceptional scores were recorded. The two low prize winners were John H. Budde Jr. and C. F. Woelms, both of whom had 80, with 20 golfers in all participating in the winnings. Attendance prizes, about 110, each consisting of merchandise, of no mean amount, were distributed, these being provided by more than 150 foundry supply companies.

A number of those attending the outing came from other cities and states, especially supply men. Among Wisconsin foundrymen outside of Milwaukee, five department heads from Kohler Co., Kohler, Wis., could be seen in the crowd, and several from the Inland Gray Iron Foundry at Watertown, Wis., a comparative newcomer in the field.

The dinner in the evening was buffet style and very good but extended over several hours, due to the number to be served.

The day was concluded with an exceptionally good floor show which lasted about two hours. The committee in charge of the event included C. L. Tanner, chairman; George Tisdale, co-chairman; John Olle, co-chairman; C. A. Gehrman; Seward Shaver; Ted Meagher; Earl Johnson; Frank Jacobs; R. F. Jordan; and Marvin A. Knoller.—*John E. Hubel.*

Birmingham

BIRMINGHAM District Chapter of the AFA will open its 1947-48 schedule with a picnic planned for Sept. 20 at the Roebuck Country Club. Entertainment committee anticipates a crowd of between four and five hundred.

Regular monthly dinners and technical sessions have been scheduled for the third Friday of each month, October through May, except in December (no meeting) and February. The regional conference planned for Feb. 12, 13 and 14 will replace the regular February meeting. Regular monthly meetings will be held at the Tutwiler Hotel, Birmingham. — *J. P. McClendon, Stockham Pipe Fittings Co.*

Book Review

ASM Review of Metal Literature 1946, cloth, 811 pages, 6 x 9 inches, published by the American Society for Metals, Cleveland 3.

This volume is a collection of installments published in *Metals Review* from Feb. 1946 through Jan. 1947, and represents a survey of the metallurgical literature published from January through December, 1946. Material is presented under 27 broad headings such as ores and raw materials, properties of metals and alloys, corrosion, cleaning and finishing, analysis, foundry practice and equipment, furnaces and fuels, heat treatment, etc., and in addition contains a subject index with sufficient cross indexing to locate specific references. The annotations prepared by the library staff of Battelle Memorial Institute, Columbus, O., are brief abstracts designed to indicate the scope and content of the articles. An author index also is included.

Foundryman's Daughter Is "Miss Texas"

WHEN the beautiful girls from every state in the union gather in Atlantic City Sept. 1 for the selection of the coveted title of "Miss America," Texas will proudly present Lynn McClain as its representative. She is the daughter of Edgar McClain, who has been a molder with the Lufkin Foundry & Machine Co. for 22 years. Miss McClain majored in art and voice at Stephen F. Austin College, Nacogdoches, Tex. Picture of "Miss Texas'" family at left shows Mr. and Mrs. McClain, Lynn and Edgar Allan Jr.

Elected Heads Of Various AFA Divisions

FRED G. SEFING
Chairman
Educational Division

MANLEY E. BROOKS
Vice Chairman
Aluminum-Magnesium Div.

LAURENCE H. HAHN
Chairman
Steel Division

WALTER W. EDENS
Chairman
Brass-Bronze Division

GEORGE P. HALLIWELL
Vice Chairman
Brass-Bronze Division

ALFRED W. GREGG
Vice Chairman
Educational Division

PETER E. KYLE
Vice Chairman
Sand Division

RUSSELL J. ALLEN
Chairman
Gray Iron Division

WALTER BONSACK
Chairman
Aluminum-Magnesium Div.

R. G. McELWEE
Vice Chairman
Gray Iron Division

ALBERT F. PFEIFFER
Chairman
Pattern Division

WILLIAM B. McFERRIN
Vice Chairman
Malleable Division

LEON J. WISE
Chairman
Malleable Division

H. RIES
Chairman
Sand Division

CHAIRMEN and vice chairmen for 1947-1949 have been elected by various divisions of the American Foundrymen's Association at their respective annual business meetings. Named to head these divisions as chairman and vice chairman, respectively, are the following:

Aluminum and Magnesium — Walter Bonsack, director of laboratories National Smelting Co., Cleveland, and Manley E. Brooks, foundry engineer, Dow Chemical Co., Bay City, Mich.

Brass and Bronze—Walter W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee, and George P. Halliwell, director of research, H. Kramer & Co., Chicago.

Educational—Fred G. Sefing, research metallurgist, International Nickel Co., New York, and Alfred W. Gregg, technical assistant to the president, Whiting Corp., Harvey, Ill.

Gray Iron—Russell J. Allen, metallurgical engineer, Worthington Pump & Machinery Corp., Harrison, N. J., and R. G. McElwee, foundry alloy division manager, Vanadium Corp. of America, Detroit.

Malleable—Leon J. Wise, assistant to the president, Chicago Malleable Castings Co., Chicago, and William B. McFerrin, metallurgist and district service manager, Electro Metallurgical Co., Detroit.

Pattern—Albert F. Pfeiffer, assistant general superintendent, Allis-Chalmers Mfg. Co., Milwaukee, and Leonard F. Tucker, president, City Pattern & Foundry Co., South Bend, Ind.

Sand—Dr. H. Ries, Ithaca, N. Y., and Prof. Peter E. Kyle, Cornell University, Ithaca.

Steel—Laurence H. Hahn, metallurgical supervisor, Sivyer Steel Casting Co., Chicago, and Charles Locke, chief metallurgist, West Michigan Steel Foundry Co., Muskegon.

Fillmore & Fillmore, 259 Delaware Ave., Buffalo, have been appointed exclusive agents for W. S. Rockwell Co., Fairfield, Conn., in the sale of furnaces, ovens and valves, in western New York and northwestern Pennsylvania.

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Long wearing qualities.
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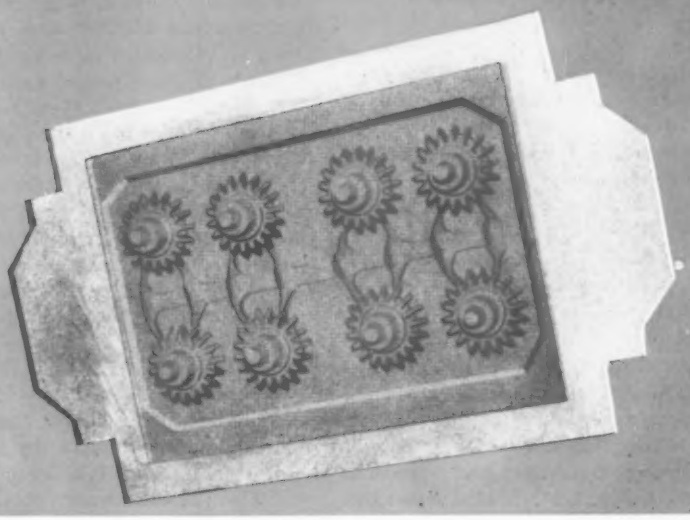
Moderate cost.
Unusual strength.
Abrasion-resistant.



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*We take this opportunity to announce to foundrymen that we have developed special techniques and practices which make plastic patterns a practical reality for production use. At the present time, we are serving numerous foundries with low-cost patterns plates which have proved to be definitely superior—plastics as we use them adapt themselves admirably to the duplication of single shrink patterns, duplication of broken aluminum patterns, master patterns, cope and drag sections, and core boxes. For more detailed information on the uses, applications and attributes of plastic patterns, *we invite you to write for a copy of our BULLETIN describing "Plastiplate" plastic patterns.*

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FOUNDRY PROGRAM STARTS AT FIVE UNIVERSITIES

(*Continued from page* 102)

of Technology, Prof. Howard F. Taylor will be assisted by Louis M. Diran and Paul F. Hughes as instructors in foundry technology. At the University of Wisconsin, Prof. George J. Barker has Associate Prof. Phillip C. R. Rosenthal, formerly of Battelle Memorial Institute, in charge of advanced foundry work, along with Richard A. Heine, formerly of the General Motors Institute at Flint, as instructor in foundry laboratory work and Assistant Prof. David J. Mack for metallurgical instruction.

A highly important but little appreciated feature of the co-operation which has been extended by the universities participating in the program lies in the expenditure of funds for remodeling buildings and procuring other equipment for related instruction. This expenditure is in addition to the grants which have been made by the foundation for the purchase of equipment. Expenditures by the various universities will enable them to have excellent facilities available to carry out the technical part of the foundry engineering program. This can best be described by presenting the work that is being done at the five universities:

Case Institute of Technology is completing the addition of a third story to the Department of Metallurgical Engineering, at a cost of $180,000, in which will be placed equipment for metallurgical study valued at $100,000. This increase in space makes it possible to install a specialized foundry in addition to the regular sand foundry. The metallurgical equipment, which supplements foundry work in the form of heat treating furnaces, testing machines and low temperature equipment, must have a share of its cost assigned to the study of foundry engineering. The proportionate share of cost to foundry training is approximately $100,000.

The co-op program at the University of Cincinnati, whereby students attend classes for eight weeks and then work for eight weeks, permits the use of industrial facilities for training purposes. Thus, they do not require the extensive laboratory facilities of a straight training program. They will, however, add to their present relatively complete metallurgical equipment by $3000 worth of items for the foundry program.

The present foundry at Cornell University is being expanded through the removal of the welding and metal working equipment to other areas, thereby adding 3000 square feet for foundry instruction. The approximate value of this addition is $15,000 to which must be added the remodelling costs, bringing the total cost to a minimum of $20,000.

While Massachusetts Institute of Technology has plans under way for a $1,000,000 building devoted entirely to metal processing, there will still be considerable expense under present circumstances brought about by the installation of furnace equipment and the requisite power needs to serve the foundry laboratory. Estimates vary, but the final costs will probably be in the neighborhood of $10,000-$12,000.

At the University of Wisconsin, two wartime buildings adjacent to the Department of Mining and Metallurgy are being remodelled to provide foundry laboratory and instruction facilities within the one building. The value of these buildings, plus $18,000 specified for remodelling, brings the cost to an excess of $40,000.

Raise Level of Appreciation

The facilities being added not only will assist in the training of engineers for the foundry industry, but will add to the quality of instruction in foundry principles given to all engineering students in each of the universities. As the program develops, it is anticipated that the level of appreciation which engineering graduates will develop in regard to foundry operations will be considerably above that of past years.

The accompanying chart describes the number of scholarships which will be available at each of the universities, along with the graduates which the program will produce as it develops over the next three years.

It is the hope of the foundation that other students will voluntarily elect the foundry industry as a career. This program will not produce the number of graduates necessary to staff the industry with engineering talent. It will, however, provide a method of training which any student interested in the foundry industry can take.

The training and experience of the men who will handle the educational program at the five universities is as follows:

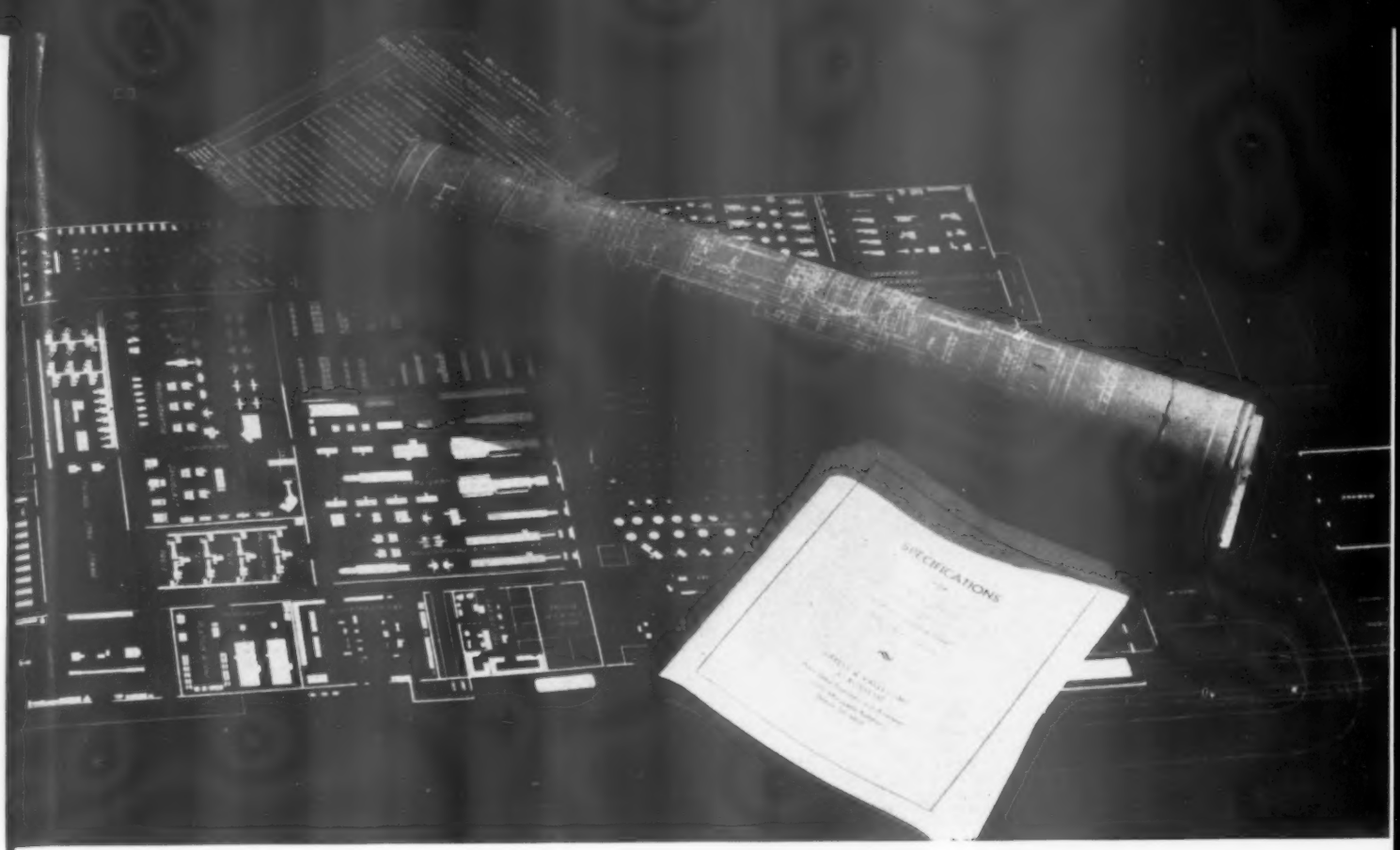
Kenneth H. Donaldson, professor of metallurgy and head of the department of metallurgical engineering at Case Institute of Technology, Cleveland, was graduated from Columbia University in 1912, with the degree of engineer of mines. Following graduation he worked in the lead mines of Idaho, later spending two years at Great Falls, Mont., as investigator and assistant testing engineer with the Boston and Montana reduction department of Anaconda Copper Mining Co. From 1915 to 1921 Professor Donaldson was assistant testing engineer and general foreman of the concentrating plant, Arizona Copper Co. Since that time he has been connected with Case, except for one leave of absence in 1931-32, when he acted as consultant to the Soviet Union, as a member of a group employed by the Ogleby-

(*Concluded on page* 155)

Scholarships and Graduates in Foundry Engineering Training Program

	Year	Scholarships 1947	Graduates	Scholarships 1948	Graduates	Scholarships 1949	Graduates	Scholarships 1950	Graduates	Scholarships 1951	Graduates	Scholarships 1952	Graduates
Case Institute of Technology	1												
	2	15		15		15		15		15		15	
	3			10		10		10		10		10	
	4					10		10		10		10	
	5												
	Summer			15		25		25	10	25	10		10
University of Cincinnati	1												
	2												
	3	4		6		6		6		6		6	
	4	6		6		6		6		6		6	
	5	2		6	2	6	6	8	6	8	6	8	6
Cornell University	1	10		5		5		5					
	2			10		5		5		5		5	
	3					10		5		5		5	
	4							10		5		5	
	5									10		5	10
Massachusetts Institute of Technology	1												
	2												
	3	5		10		10		10		10		10	
	4			5		10		10		10		10	
	5						5		10				10
University of Wisconsin	1												
	2												
	3	5		10		15		12		12		12	
	4			5		10		15		15		15	
	5						5		10		15		15
Total		47		88	2	118	16	127	36	127	31	122	51

46 graduates per year after 1952



MONEY SAVING TOOLS

Layouts, drawings, specifications, bills of material. These documents, prepared by Giffels & Vallet, Inc., represent condensed experience gained in engineering foundry projects for more than twenty years. They are the plan of attack for building toward lower production costs. They are the tools used to acquire competitive prices on equipment, materials, and construction labor. They represent designs in which the engineering has been integrated so that delays and costly field changes are eliminated. These tools are available to you for the development of your plans for new foundries or for expansion and modernization programs.

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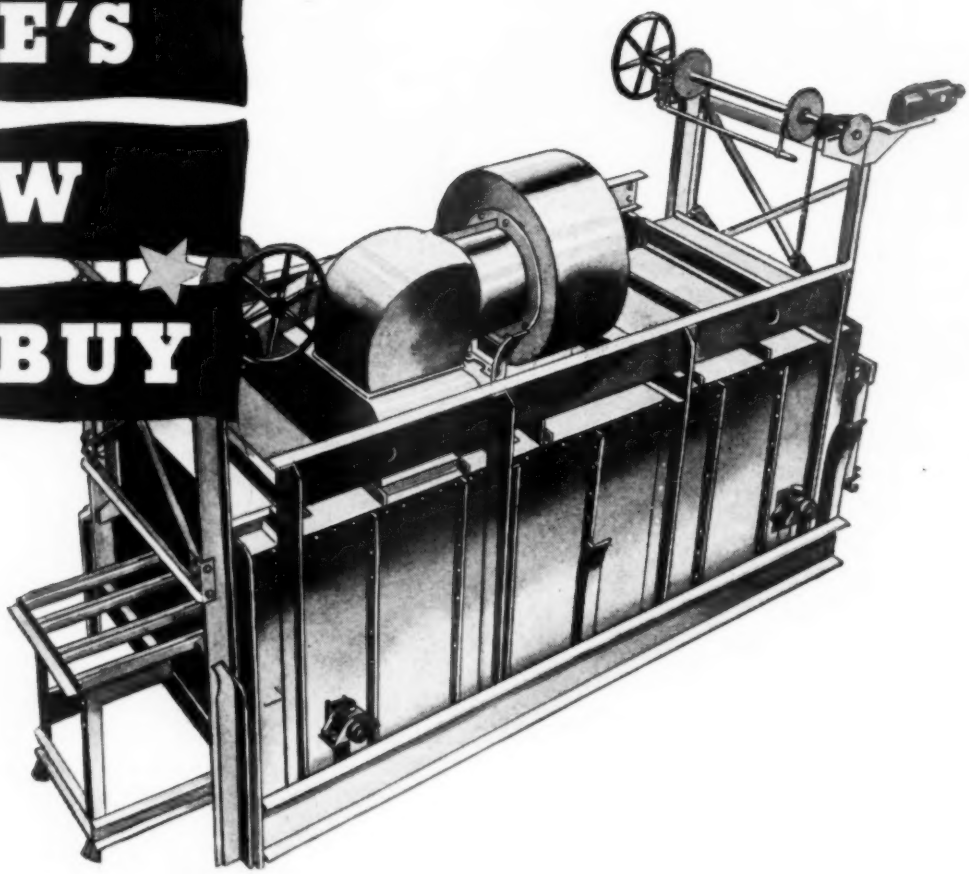

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CUSTOMER SERVICE CENTERS IN THESE AND MANY OTHER CITIES

(*Concluded from page 152*)

Norton Co., Cleveland, for this mission. In 1945 he was sent to England and Germany by the Foreign Economic Administration to study iron ore beneficiation in Germany.

Howard F. Taylor, who was appointed associate professor in charge of foundry teaching and research, Massachusetts Institute of Technology, Cambridge, Mass., in July, 1946, joined the institute as research associate to study for his doctorate, in November, 1945. A native of Leslie, Mich., Professor Taylor received both bachelor of science and master of science degrees from Michigan State College, East Lansing, Mich., where he was part time instructor in metallography in 1936-37. He reported to Naval Research Laboratory, Washington, in July, 1937, as assistant to the welding engineer and was made head of the foundry research section there two years later. Active on various AFA technical committees, he also served as president of the Chesapeake Chapter of the AFA in 1945-46. Last year at the Cleveland convention of the AFA, Professor Taylor was awarded the Peter L. Simpson Memorial Medal in recognition of his work in foundry research and development. Since leaving the Naval Laboratory he has done foundry consulting work for bronze, aluminum, malleable iron, gray iron and steel foundries.

Peter E. Kyle, since July, 1946, has been professor of applied metallurgy in the College of Engineering, Cornell University, Ithaca, N. Y., where he has helped organize a new curriculum in metallurgical engineering and has developed the group of courses in metal processing, involving casting, hot and cold working and welding. Born at Lakeport, N. H., Professor Kyle was associated with Scott & Williams Inc., Lakeport, as a machinist apprentice prior to joining Westinghouse Electric Corp., East Pittsburgh, Pa., in 1927, as a student engineer. He remained there from 1927-29, becoming laboratory assistant in the research laboratories and attending evening courses at Carnegie Institute of Technology. Professor Kyle was graduated from Cornell University in 1933, attended the graduate school of Lehigh University, and received a master's degree from Massachusetts Institute of Technology in 1939. While at the latter school, from 1934 to 1946, he was in charge of courses on materials and metal processing and was made an associate professor in 1944. At Cornell, he has been in charge of the AFA project on the high temperature properties of steel sands and was appointed vice chairman of the AFA sand division last year. During the recent war he was research supervisor and staff assistant for the Products Research Division of the War Metallurgy Committee, while on leave from MIT in 1943-44.

Reuben S. Tour, head of the department of chemical engineering at University of Cincinnati, has been professor of chemical engineering at that university since 1921. Professor Tour was born in Troy, N. Y., and was graduated from University of Michigan in 1910, receiving higher degrees in science and chemical engineering in 1915 and 1926. From 1913-17 he was assistant professor of gas engineering, University of California at Berkeley. During World War I he served as a captain in the Ordnance Department, in charge of technical direction of operations at Sheffield, Ala., from 1917-19, and during 1919 was a member of U. S. Fixed Nitrogen Commission, investigating European war plants. From 1919-21 he was in the Ordnance Department, Washington, as a civilian chemical engineer. Professor Kyle has had numerous articles published as the result of research experience in ammonia synthesis, gas absorption, flow of fluids, and dimensional analysis.

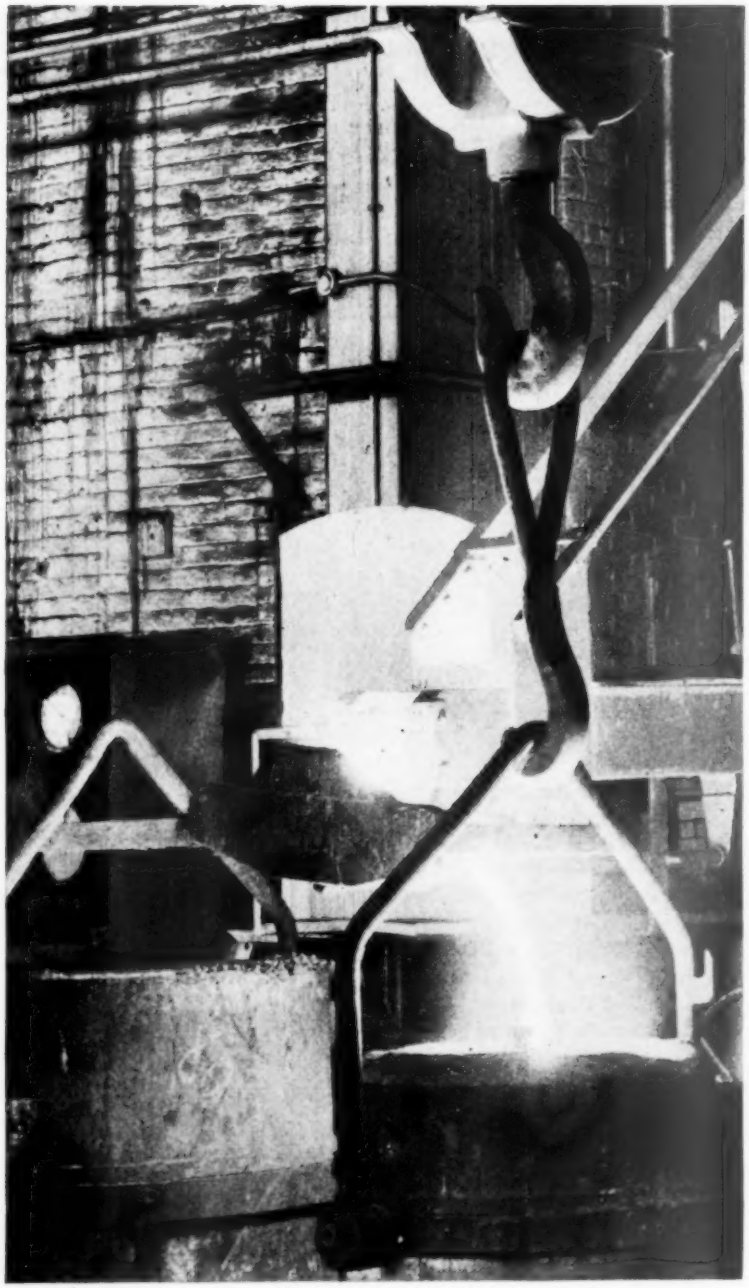
George J. Barker for the last four years has been chairman of the department of mining and metallurgy at the University of Wisconsin, College of Engineering, and has been associated with that department since 1920. A native of Sparta, Wis., Professor Barker received his bachelor of science degree from University of Wisconsin in 1920, and a professional degree in mining engineering there in 1923. He had gained industrial experience previously as superintendent for the National Zinc Separating Co., as master mechanic in phosphate mining for Armour & Co., and as engineer for Anaconda Copper Co. For a number of years Professor Barker has been an active member of the AFA Educational Division, and its predecessor, the Committee on Co-operation with Engineering Schools.

Thomas Butlin & Co., Wellingborough, England, a branch of United Steel Cos. Ltd., has been bought by Morris Motors Ltd. to provide potential capacity for tractor and similar type of iron castings. It will be operated as a department of Morris Motors Ltd., engine branch.

ALUMINUM PIGS are stacked at the Spokane, Wash., reduction plant of the Permanente Metals Corp. Silo in background is for alumina storage with conveyor feeder tunnel at extreme top. This Kaiser-managed company recently announced establishment of a new division to handle sales of aluminum pig and alloy ingots

AN EFFECTIVE METHOD

of Improving the Structure of Cast Iron



DEOXIDIZING and inoculating iron with FERROCARBO briquettes provides a more uniform iron. Better control of silicon and carbon content is assured. Physical and mechanical properties are bettered. There is a marked decrease in segregation while various constituents of the iron are more uniformly distributed. Sound castings with improved machinability and freedom from "leakers" are secured.

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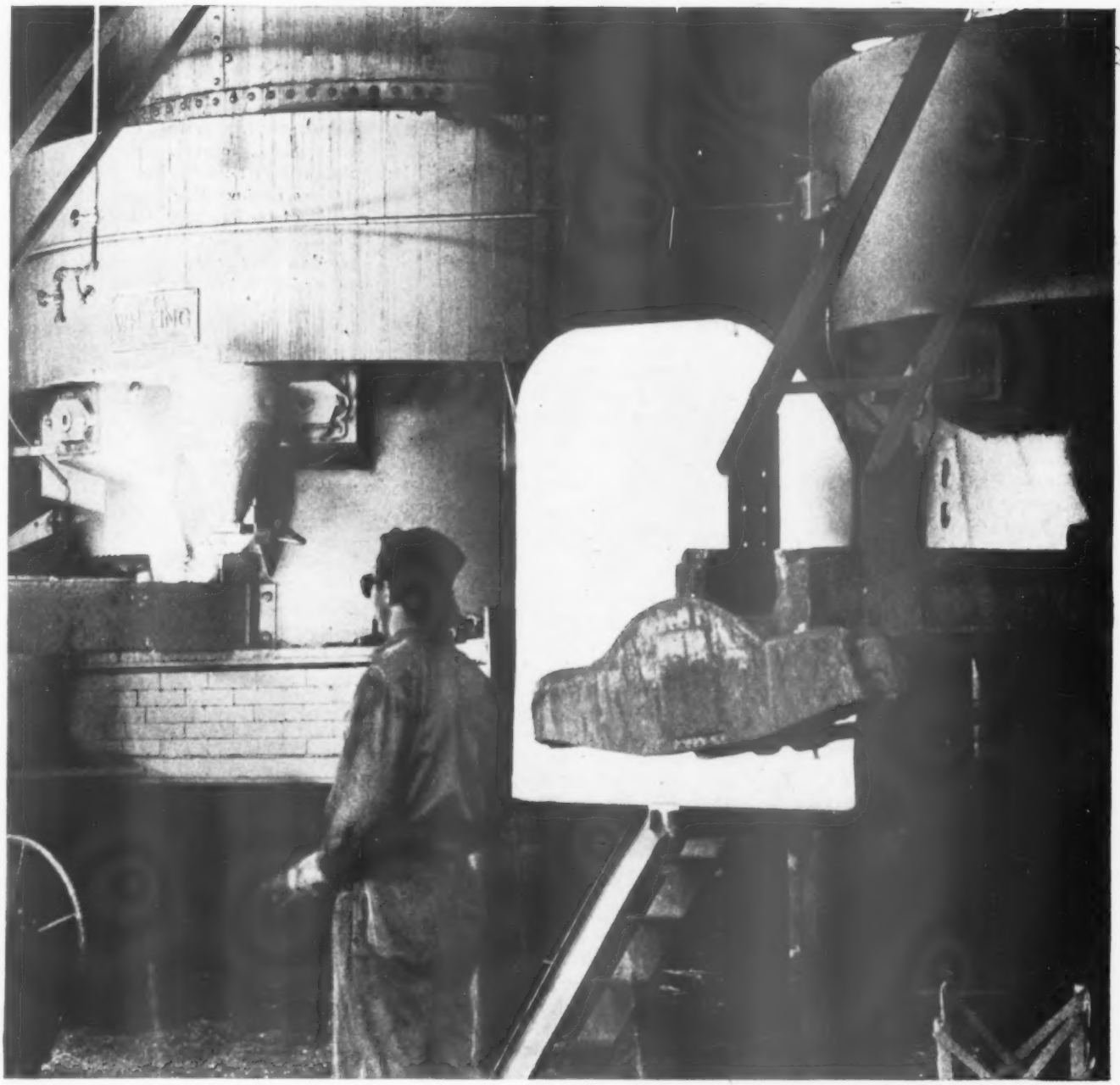
FERROCARBO briquettes are simple and economical to use. They have proved effective in many foundries as a means to improved structure with important operating savings. For a more complete realization of the possibilities of FERROCARBO briquettes in your plant—we suggest a discussion with our metallurgists.



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Industry BRIEFS

SALES of foundry equipment in June were 649.9 per cent of the 1937-1939 monthly average, according to the Foundry Equipment Manufacturers Association. Sales were 548.6 per cent in May and 491.7 in June, 1946. The June index was the highest since April, 1946.

• • •

Wisconsin Centrifugal Foundry Inc., Whitewater, Wis., has been moved to 905 East St. Paul Ave., Waukesha, Wis. Company was known formerly as Whitewater Centrifugal Casting Co. M. E. Nevin is president and Paul Schneider, vice president and works manager.

• • •

Vermilion Malleable Iron Works, Hoopeston, Ill., has begun a modernization, revamping and expansion program designed to increase production. Installation of conveyor systems and new cleaning equipment is planned.

• • •

Hoosier Mfg. Co., Crawfordsville, Ind., plans construction of a 50 x 120 ft wood and metal pattern shop. Paul J. Bernier and Roy G. Orgren, who also operate a pattern shop in Saginaw, Mich., are owners.

• • •

Acme Foundry Co., Detroit, has replaced its old foundry with a modern structure for the production of gray iron and alloy iron castings. The main bay is 50 ft wide and is equipped with a 25-ton, two 15-ton and a 5-ton crane with ample head room. A side bay, 40 ft wide, is serviced by a 5-ton crane. William Christian is president.

• • •

Gray iron casting production for June in the Philadelphia Federal Reserve District decreased 10.2 per cent from May and was 1.4 per cent below June, 1946, according to the University of Pennsylvania's Industrial Research department. Malleable iron casting production was 29.8 per cent lower than the previous month but 3.8 per cent over June, 1946. Steel casting production was 19.1 per cent below that of May and 6.8 per cent under June, 1946. Production of nonferrous castings declined 7.6 per cent from May and was 3.6 per cent below that of June, 1946.

• • •

Gerity-Michigan Die Casting Co., Adrian, Mich., has acquired the plant of the Brown Fence & Wire Co., that city. Purchase includes a group of seven buildings, with total area of 80,000 sq ft, which will be used for general office space and enlarged shipping department and warehouse.

• • •

Kimberly Cast Products Inc., 3540 Union Pacific Ave., Los Angeles, was recently formed with $75,000 capital to engage in the melting, smelting and casting of ores and metals. Address of the company was incorrectly given in the June issue of THE FOUNDRY. In addition to the directors listed in that issue, the following names have been added: George J. Kenagy Jr., Glendale, and Lloyd B. Jensen, Burbank, Calif.

• • •

Everett Foundry Inc. is the new name of the gray iron jobbing foundry at Everett, Mass., formerly operated as the Delano Iron Foundry Inc. Equipped to produce castings of all types and shapes ranging from 2 to 2000 pounds in weight, present capacity is approximately 7 tons per day. Plans now under study call for an expansion in capacity, and for modernization. The new owners are Charlton Reynders, 120 Broadway, New York, and Russell Swiler, Cleveland. Officers are: President and treasurer, Charlton Reynders; executive vice president, Russell Swiler; vice president and general manager, Ralph A. Macaruso. J. Leo Jacques is foundry superintendent. Charles J. Scullin will act as the company's consultant on foundry practice.

• • •

Cadillac Foundry Co., Cadillac, Mich., has completed construction of a new production gray iron foundry. Building is of steel and cement block construction, 70 x 160 ft, and is provided with modern melting, molding, coremaking and cleaning equipment. The foundry, cost of which is estimated at $100,000, will produce small and medium size gray iron castings. S. E. Langenberg is owner and operator.

• • •

Hercules Division of Batavia Metal Products Inc., Batavia, Ill., plans expansion of plant facilities at the division gray iron foundry in Centerville, Iowa. Some structural alterations are anticipated including moving the pattern shop into the basement of the new building. Daily production of 50 tons is planned.

• • •

Ajax Alloy Foundry Inc., Baltimore, has started production in its new foundry at 32 South Franklintown Rd. The company will produce small nonferrous castings up to 50 or 60 lb. W. J. Craft is president of the company.

• • •

Shipments of ingot brass and bronze for June, amounted to 15,929 tons compared with 19,525 tons in May, 1947, and 31,349 tons in June, 1946, according to the Ingot Brass and Bronze Industry, 308 West Washington St., Chicago 6.

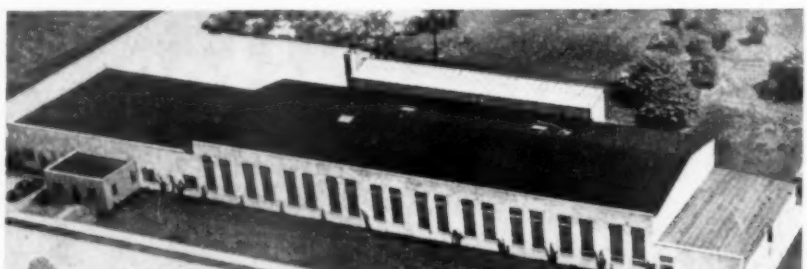
• • •

Herco Foundry, 5335 Southern Ave., South Gate, Calif., plans construction of a 28 x 170 ft addition to its foundry building, at a cost of $10,000.

• • •

North American Philips Co. Inc., New York, x-ray equipment manufacturer, has acquired a new two and a half-story concrete factory building in Mt. Vernon, N.

(*Concluded on page 160*)



NEW FOUNDRY: The new foundry completed recently at Watertown, Wis., for the Waukesha Foundry Co., is now in full swing making nonferrous castings. The building, shown here, is about 75 x 335 ft, and the most modern foundry equipment has been installed. About 100 persons are employed in the new plant which is about 20 miles west of the company's main plant in Waukesha.

Redford

CORE BLOWER CARTRIDGE TYPE

A few of the thousands of cores that are made daily on Redford Core Blowers.

• PROVEN •

Hundreds of foundries are using Redfords as an efficient low cost means of producing small cores. The high percentage of reorders we receive proves that Redfords are profitable to own.

• SIMPLICITY •

The Redford reduces core blowing to its simplest form. Anyone can understand—operate and maintain it.

• SPEED •

All the work of handling core box and driers is done on the machine. Cartridges can be quickly loaded by hand. As many as 200 boxes are being blown and drawn by one operator in one hour.

• FLEXIBILITY •

With a Redford you can make any number of different cores without loss of time for changeovers. Here is what a large jobbing foundry has to say: "We are using 7 Redfords. Your development of the portable cartridge which can be made a part of the core box equipment, has given us all the advantages of core blowing without loss of flexibility so essential to us."

SAND CARTRIDGES AVAILABLE IN 10 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in nine additional standard sizes and special sizes furnished where needed.

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MOLDING SAND ● FURNACE SAND *The Quality you Need*

4 FOUNDRY AND FURNACE SANDS

- PORTAGE
- GEAUGA
- COXEY
- VENANGO

All types of sand are available—for light, heavy and medium steel castings and for acid furnace bottoms. They are preferred by foundry men for their high quality and workability. Each is shipped from a plant in the heart of the steel foundry industry. Also sand blast sand for every need.

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Stambaugh Bldg.

Youngstown, Ohio

FOUR PLANTS » » » » » » » » » »

Phalanx, Ohio — Geauga Lake, Ohio

Dundee, Ohio — Utica, Pa.

(*Concluded from page* 158)

Y., containing 60,000 sq ft of space for consolidation and expansion of engineering, production, testing and warehousing.

* * *

Standard Brake Shoe & Foundry Co., West Pullen St., Pine Bluff, Ark., has been purchased from the E. S. Dilley estate by John M. Young, Gordon E. Young and Stanley Cook. The firm which also has a plant in Memphis, Tenn., makes steel and iron castings. Mr. Cook, who for the last 5 years has been general manager and vice president, will be president. No change in operation or personnel of the company is contemplated.

* * *

Laclede-Christy Clay Products Co., St. Louis, has purchased all capital stock of the Osceola Silica & Firebrick Co., Osceola Mills, Pa. Albert B. Agnew has been appointed general manager of the Osceola Co.

* * *

Dill Inc., 625 West Fourth St., Rushville, Ind., recently added a pattern shop to its foundry department. The shop, operating under the name of Smith Pattern Works, is located one block from the Dill foundry.

* * *

Pope Foundry Co., Marion, Ind., has completed an addition to its foundry, constructed adjacent to the present plant. The new building, 45 x 140 ft, houses cleaning room, shipping room, office space and additional pouring floors.

* * *

H. M. Foundry Co., Plymouth, Ind., under the management of Casper Haas, president and owner, has installed an extensive aluminum permanent molding section in its foundry, built last year for the sand casting of brass and aluminum.

* * *

Oneida Foundries Inc., 559 Fitch St., Oneida, N. Y., is the new name of the former Conde Foundries Inc., recently purchased by William O. Smith, R. L. Baldwin and C. C. Shay.

* * *

Building permit has been issued to Standard Foundry Co., Racine, Wis., to make extensions to one of its foundry buildings. A mezzanine floor is to be installed, with new locker and toilet rooms.

* * *

Los Angeles Steel Castings Co., 2444 Alameda St., Los Angeles 11, has obtained building permit for construction of a plant addition at 6100 South Boyle Ave., Vernon, Calif.

* * *

Gilbert's Brass Foundry, 1344 Coil St., Wilmington, Calif., is being operated by Elden R. Gilbert.

* * *

Southern Railway Foundry, Richmond, Va., has discontinued operations for an indefinite time.

GOOD NEWS

FOR THE SMALL FOUNDRY

NEW SIMPLICITY 12" x 18" PORTABLE SAND SCREENING AND CONDITIONING UNIT FOR THE SMALL FOUNDRY

Here's the ideal sand screening and conditioning unit for the small foundry where production does not warrant installation of large-capacity and relatively expensive sand handling equipment. The Simplicity 12″ x 18″ Portable Sand Conditioner screens, aerates, and fluffs 7 tons of sand per hour with all the efficiency and dependability of the larger Simplicity models. It is easy to move, weighing only 415 lbs., and its overall dimensions of 28″ x 28″ x 29″ demand a minimum of working and storage space. You can depend on sand conditioned in the Simplicity 12″ x 18″ Portable to help assure production of the high quality castings which foundry operators the country over are producing with Simplicity equipment.

FOR THE LARGER FOUNDRY

Simplicity Portable and Semi-Portable Sand Screening and Conditioning Units are made in four other sizes: 2′ x 3′ — 3′ x 6′ — 4′ x 4′ and 4′ x 8′.

Send us your production requirements and we will be glad to recommend the specific model for your foundry.

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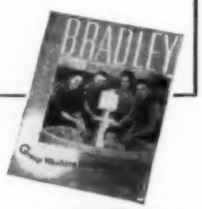

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OBITUARY

RAYMOND R. RIDGWAY, 50, assistant research director, Norton Co., Worcester Mass., drowned June 12, when he fell from his sailboat in the Niagara River, near his home in Niagara Falls, N. Y. Mr. Ridgway, a graduate of Massachusetts Institute of Technology, was outstanding for his research in electro-chemistry and design of electric furnaces for production of abrasives, improvements in the manufacture of fused alumina, silicon carbide and magnesia, and production of hard metal carbides.

• • •

Frederic W. Willard, 66, who retired recently as president of Nassau Smelting & Refining Co., Tottenville, N. Y., died Aug. 11, at his home in Summit, N. J. Mr. Willard joined Western Electric Co., Chicago, following graduation from University of Michigan, as research chemist. He advanced through various posts and when Western Electric Co. acquired Nassau Smelting & Refining Co., in 1931, he was made vice president and director, becoming president in 1937.

• • •

William J. Brant, 76, owner of the foundry supply company bearing his name at 709 East St., Pittsburgh, died July 28, in St. Francis Hospital, that city, following a heart attack. A native of Allegheny, Pa., he had lived there during his entire life. For many years Mr. Brant was secretary-treasurer of the Pittsburgh Foundrymen's Association.

• • •

J. Carroll Kennedy, 60, since 1927 vice president in charge of manufacturing, the Kennedy Valve Mfg. Co., Elmira, N. Y., died June 23 in that city. Mr. Kennedy was born in Brooklyn, N. Y., and attended Renssalaer Polytechnic Institute. He was one of the sons of the founder of Kennedy Valve Mfg. Co., which was established in New York City in 1877.

• • •

Safford K. Colby, 74, vice president in charge of research, sales promotion and advertising, Aluminum Co. of America, Pittsburgh, died Aug. 4, in that city, following a heart attack.

• • •

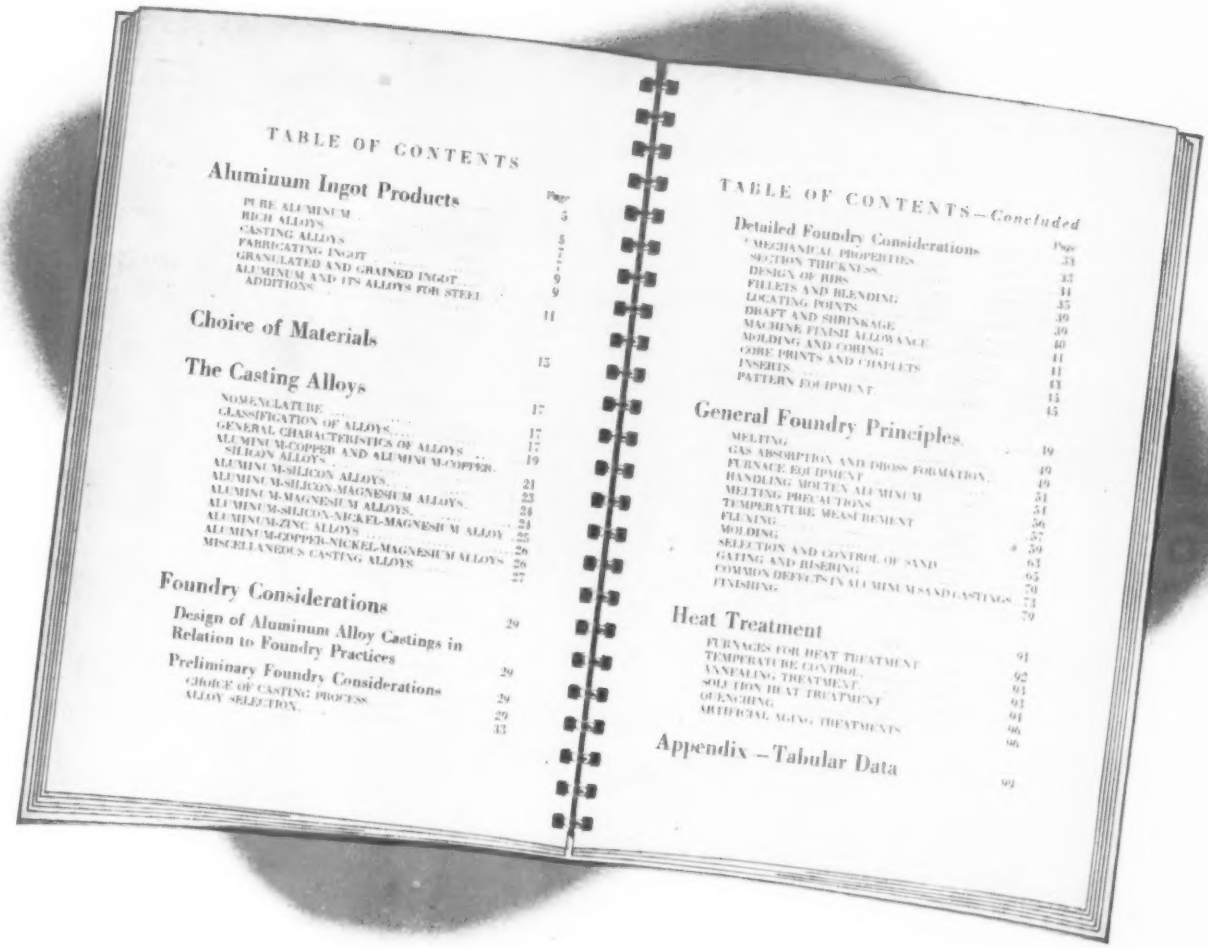
Emile Simon, 66, manager and part owner of the New Iberia Foundry & Machine Shop, New Iberia, La., founded by his father, the late George Simon, died July 7, in New Orleans.

• • •

Harry Jump, 59, sales manager, Great Lakes Carbon Corp., Chicago, died July 15, in that city.

• • •

James Crane Sr., iron foundry superintendent, Klotz Machine Co., Sandusky, O., died July 27, at his home in that city.



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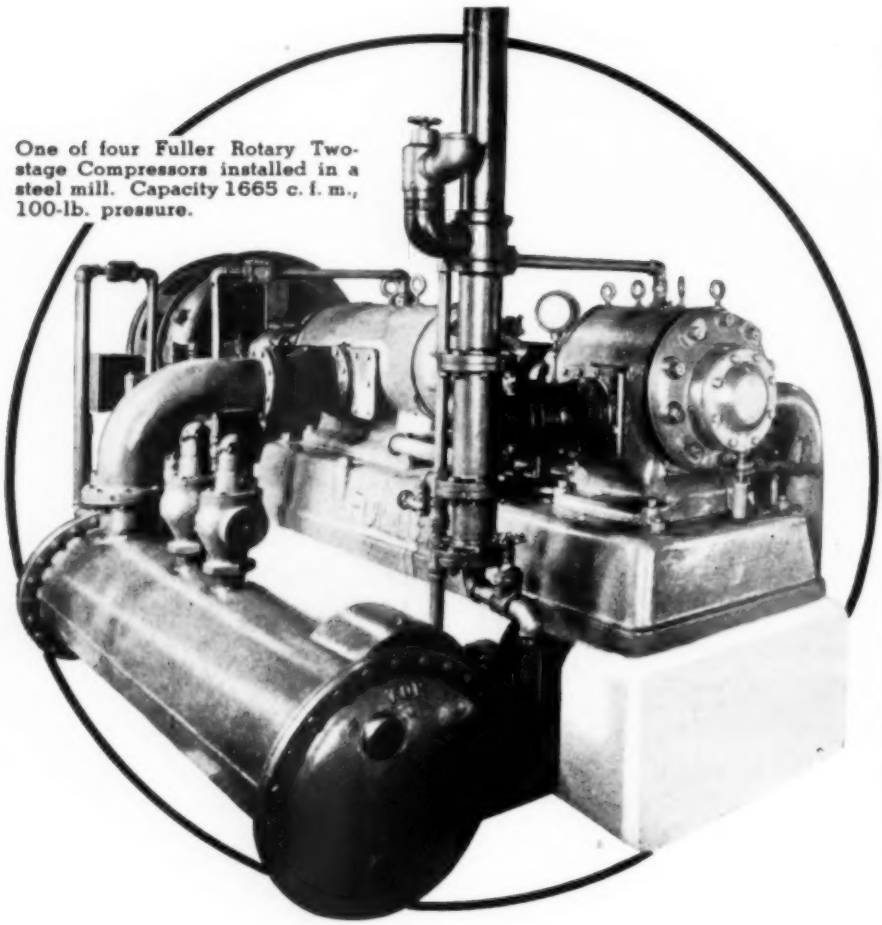

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C-156

FULLER

A LIFETIME OF NEW MACHINE EFFICIENCY

GAS AND SHRINKAGE IN TIN BRONZES

(*Continued from page 77*)

In the production of sound castings or sound test bars, control of the shape of the stress-strain curve is essential. Control of alloy compositions seems obvious, but it should be mentioned that for both G and 85-5-5-5, the effect of tramp constituents in commercial remelt ingots is evident, although it was not serious in any ingots used in this investigation. The minor variations in composition seem to go hand in hand with grain size so that, although remelt ingots will produce castings with strengths of the same order as virgin heats, the elongation will tend to be less. This grain refining action is not limited to tramp elements but is produced by the intentional addition of nickel as well.

Subject Is Controversial

For many years, nickel additions have been advocated for pressure work, the claim being made that the grain is refined and pressure tightness increased. The actual improvement in pressure tightness by nickel additions has been a rather controversial subject, with both good and bad results being cited with, as well as without, nickel. Actually, of course, pressure tightness is a function of soundness and not of grain size. The effect of a small grain size on pressure tightness is to make the path of small amounts of intergranular voids more tortuous and more disconnected, thus promoting better pressure tightness but not necessarily reducing the unsound condition.

Fig. 14 shows graphically the effect of nickel additions on the physical properties of G bronze. It is apparent from the curves that the grain-refining action is quite marked, the yield and utimate strengths being raised with lowered elongations. At higher percentages of nickel, the sand cast properties approach chill cast properties.

Cooling rate, or more properly the solidification rate, of bronze castings determines the grain size as well as dies alloy composition. Normal variations in molding sand have but little effect so that the only variables are pouring temperature and section size. For test bars, then, it is mandatory that the pouring temperature be controlled if test results are to be comparable. This conclusion is by no means new since considerable work has been done on methods of making test bars, as well as on the best type of bar to make. All these investigations have recommended temperature control for best results.

A close examination of Fig. 13 leads

(*Continued on page 168*)

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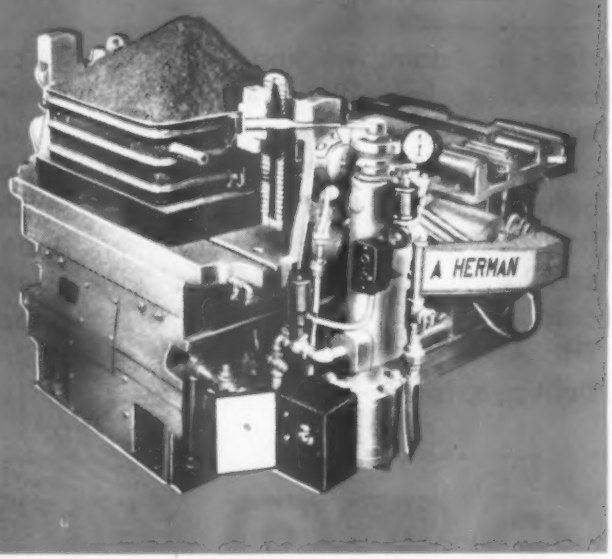

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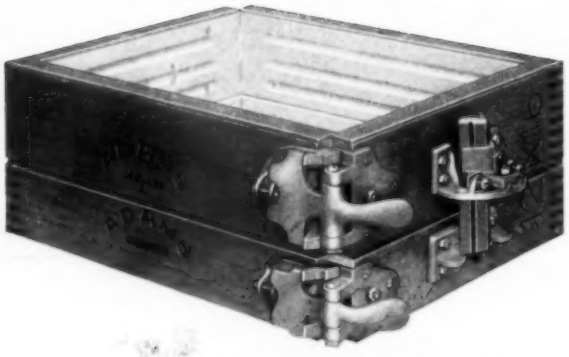

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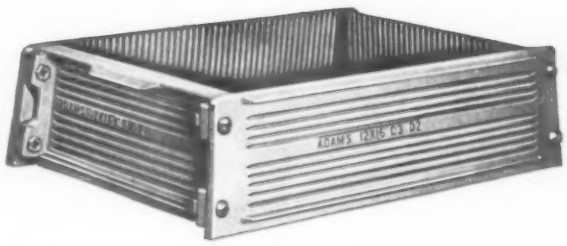

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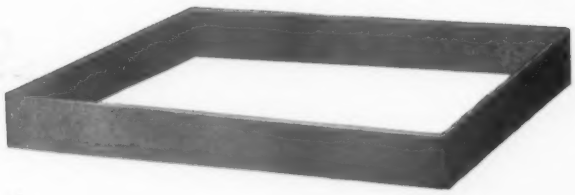

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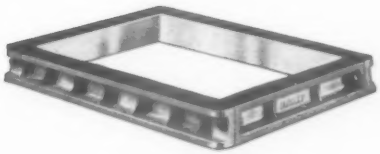

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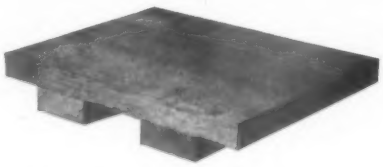

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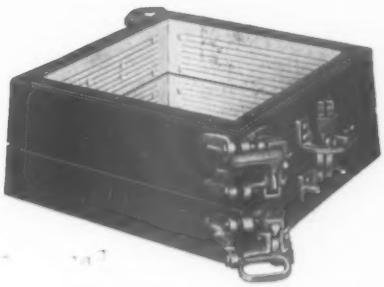

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A 5216-8

(*Continued from page* 164)

to the conclusion that for sand cast bars an elongation in 2 in. of 30 per cent or more indicates a sound casting regardless of the strength. If less than 30% elongation is obtained without chilling or high nickel additions, it may be concluded that the metal is gassed and the maximum strength of the alloy has not been developed.

During the war, shipbuilding required enormous numbers of bronze valves and fittings for pressure services. Rejections on hydrostatic tests were not alarming but subsequent leaks in service were serious. Radiographic inspection of bronze castings has indicated that general quality is poor, many castings containing considerable lacy, interdendritic voids. The strength of such castings is low and only the presence of a dense skin prevents leakers. A skin of this type is particularly evident in Fig. 2, but in service such thin skins may crack or be otherwise damaged and destroy the pressure tightness of the casting. The deleterious effect of these filamentary voids in a casting is especially evident in welding. All the tin bronzes are hot short, making any weld procedure difficult, but when the casting is unsound it lacks strength to resist the shrinkage stresses of the contracting weld metal. The result is usually a good weld surrounded by fine cracks.

Must Be Gas Free

If perfectly sound castings are to be produced, the metal must be gas free and free from shrinkage voids. British investigators have suggested that small amounts of gas will increase pressure tightness in poorly fed sections by distributing shrinkage which would be localized in gas free metal. There is ample evidence that this suggestion is true, but it is obvious that the method does not eliminate unsoundness. It is likely that radiographic requirements will be initiated for bronze castings in critical services sometime in the future and for these castings the metal must be gas free.

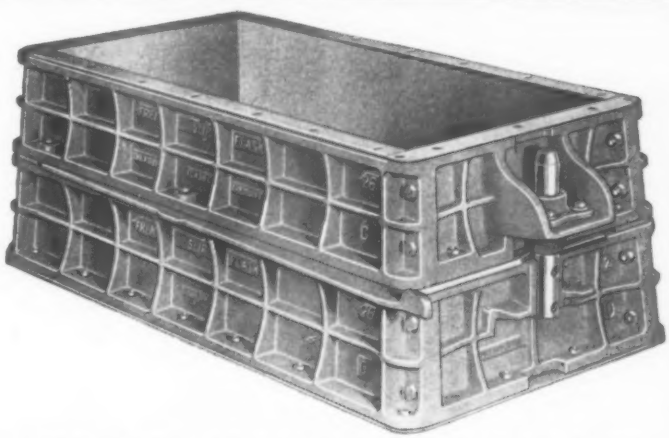
Sufficient work has been done in recent years so that the melting of gas free bronze should not be a severe problem, and this is borne out by the many foundries which are having little or no difficulty in melting today. It has been fairly well established that gas troubles spring from the solution of the gas hydrogen or the gas former carbon in the molten metal. By careful regulation of melting practice, trouble need not be encountered. Because the lacy shrinkage voids caused by gas are similar to, and additive to, normal, lacy shrinkage caused by insufficient feeding, test bars must be used to indicate the presence of gas in the metal. Since gas is indicated by low elongations it seems possible that some sort of test rig could

(*Continued on page* 170)

Cast Iron

JACKETS

Are Best by Test



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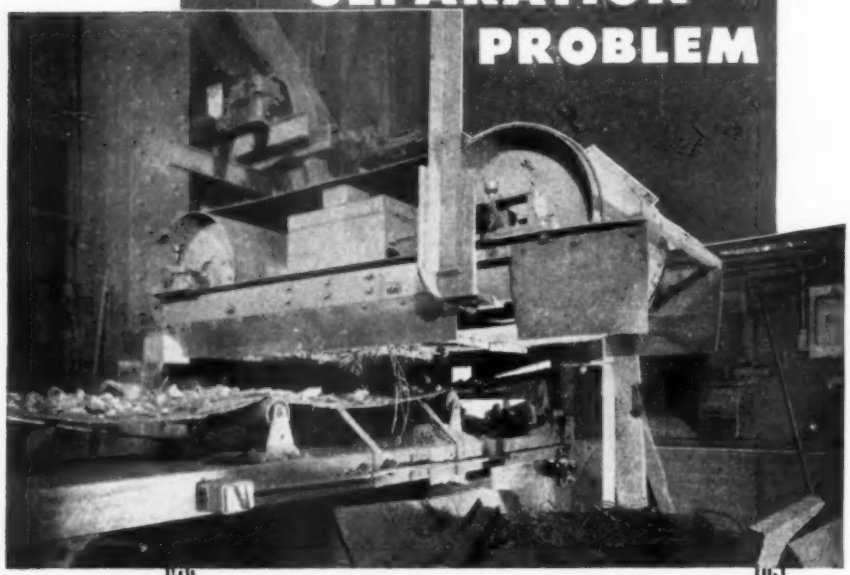

the PROBLEM Installing an effective magnetic separator in a large steel castings foundry for removal of scrap from the shakeout sand conveyor belt was difficult because of space limitations at the belt end preventing installation of a magnetic pulley, plus a large percentage of metal and a thick normal burden of material on the belt.

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"Magnetic Separation Headquarters Since 1899"

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"HIGH INTENSITY"

(*Continued from page* 168)

be devised by any foundry so that routine checks could be made without use of standard testing machines.

The control of shrinkage in bronze is extremely difficult. Tin-bronze castings have been used for centuries as engineering materials and in general their performance has been excellent. In all this time the tin bronzes have been considered to have low shrinkage and foundrymen have been able to make complicated castings with surprisingly little consideration of directional solidification. Great variety in the placement of risers, gates, and chills has not produced any such variety in quality so that today nearly every bronze foundry has its own individual ideas of how to make bronze castings. Such differences in opinion are common in iron, steel, and aluminum, as well as manganese bronze foundries, but the differences are minor compared with those in the tin bronze foundries.

Wide Solidification Range

This apparent lack of sensitivity to changes in risering technique is directly attributable to the manner of solidification of tin bronze. The considerable range in temperature from the beginning to the end of solidification allows dendrites to grow long, interlock, and restrict the flow of feeding metal which, of course, is also dropping in temperature, and thus becoming more viscous and less able to penetrate the small cavities. With such a wide solidification range, freezing is not directional toward heavier sections, but is progressing everywhere. Fig. 15 shows a radiograph of a keel block bar cast in manganese bronze which may be compared with Fig. 1.

Manganese bronze, like steel or a pure metal, has a very narrow solidification range and the shrinkage is localized. The tin bronze of Fig. 1 has roughly the same volume shrinkage as the manganese bronze, the difference being that the shrinkage is distributed. Fig. 16 is a radiograph of a 4-in. round block cast open to the air in which the shrinkage cavities are most serious at the bottom of the casting which by all laws of directional solidification should be the most sound. Whenever test bars are cut from tin-bronze castings, those cut from under the riser are usually inferior to those cut some distance away. This is further proof that the slower the cooling rate the longer will be the time in the solidification range, resulting in longer dendrites and greater restriction to feeding.

The conclusion might be drawn from this discussion that sound castings cannot be made unless the alloy is changed enough to narrow the solidification temperature range so that risers will feed

(*Continued on page* 172)

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Here's your opportunity to invest a fraction of a cent per average size casting and get amazing returns by using

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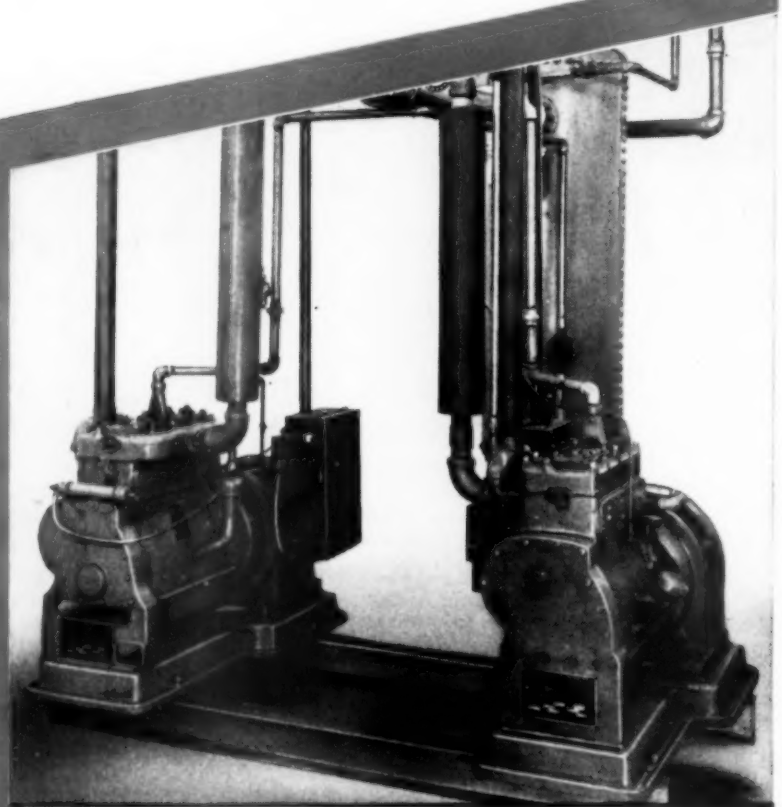

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THE COMPRESSOR PEOPLE

WEST CHESTER, PENNSYLVANIA

(*Continued from page* 170)

and the rules of directional solidification will hold. Such a move would certainly help on the one hand, but would also reduce all the natural foundry advantages in molding complicated castings that tin bronze holds over manganese bronze or aluminum bronze. By replacing part of the tin with nickel in a nominal *G*-type bronze, the freezing range is narrowed and the dendrites become much smaller. Feeding in these alloys is better than *G* and they may be considered a compromise composition which may be used more in the future. Tests have indicated, however, that these nickel bronzes with less than 5 per cent tin have inferior corrosion resistance to salt water, especially at high velocities.

Several Procedures Available

Difficulties in overcoming shrinkage in an alloy of wide solidification range can best be taken care of by locally speeding up or slowing down the normal cooling rate so that directional solidification is obtained. Judicious use of chills are of considerable aid in obtaining soundness, but risers must also be used for heavy sections. They are inefficient and sometimes ineffective, however, without some aid to keep them hot. Only when the metal in the riser is hot can it be depended upon to be fluid enough to feed through the maze of dendrites. Insulating riser sleeves are practical and can produce marked improvement in riser efficiency and effectiveness. Like other new developments they have not yet found extensive application, but when top quality is demanded, the bother and expense of their use become insignificant.

Another method of holding risers open is through the use of exothermic riser compounds which actually raise the temperature of the metal in the riser. In research for methods of improving riser efficiencies, steel foundries are far ahead of bronze foundries. Actually, the research task for bronze should be easier than for steel if for no other reason than that lower temperatures are involved.

Another method of increasing riser efficiency and casting quality for certain types of pressure fittings is by omitting the riser. Unlike steel, wall sections of cast bronze pipes are usually sound and do not contain lacy shrinkage which steel men call centerline. When such uniform sections set up in gas-free bronze, solidification proceeds towards the center from both surfaces, but wherever the shape of the part permits, the surfaces are drawn toward each other and no voids result. In most low-pressure bronze valves and fittings, section thickness of flanges and seats are little different than wall sections so that by using thin finger gates into the

(*Concluded on page* 173)

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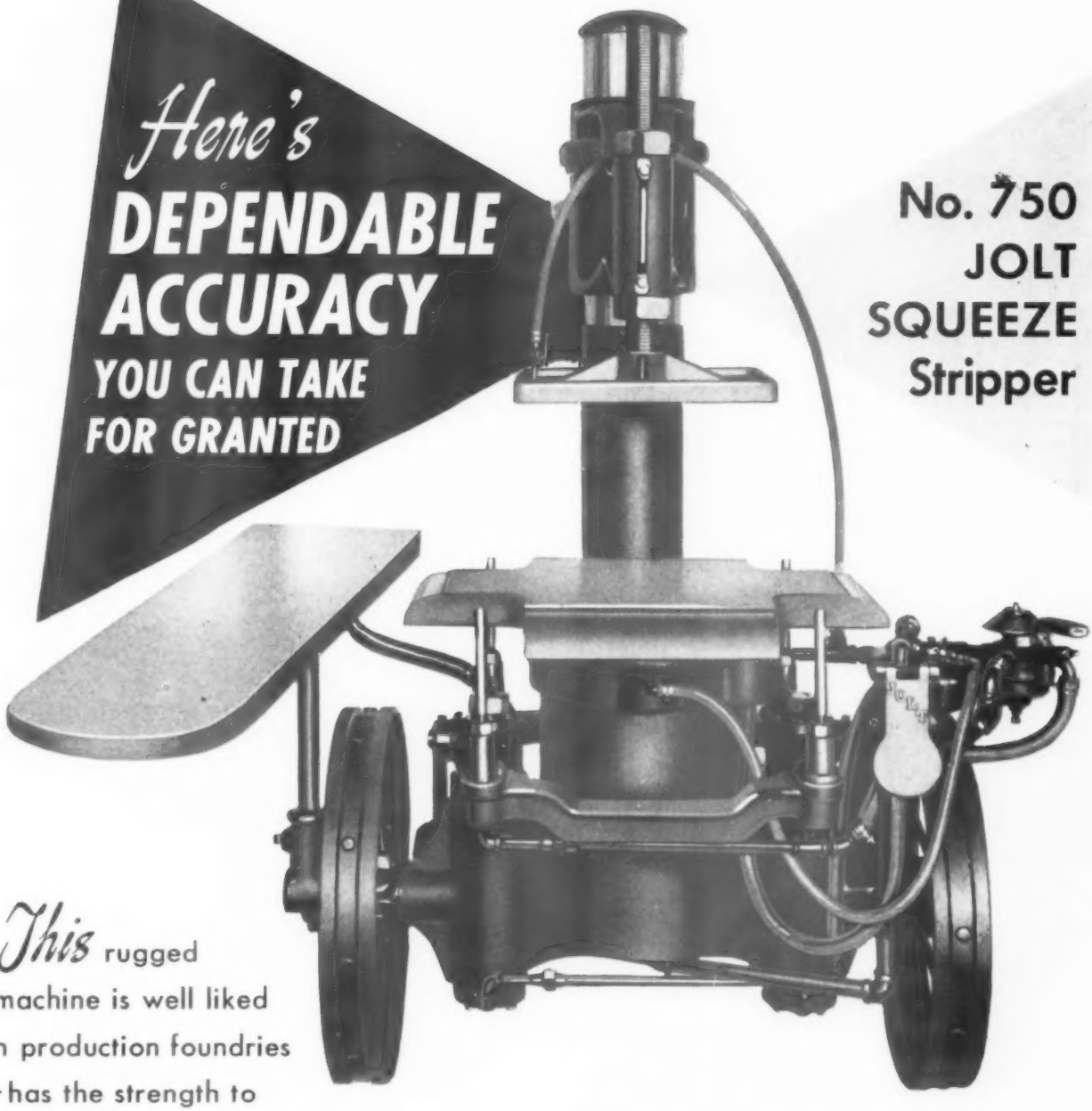

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(*Concluded from page 172*)

thinner sections better quality castings can be produced without risers than with risers. Pouring temperatures, however, must be held down if shrinkage is to be avoided. As might be expected, when section thicknesses are increased risers become necessary.

It seems that surprisingly little fundamental knowledge is available on proper methods for gating and risering bronze castings. How far a riser will feed through a given section and how large a section can safely be cast without a riser are fundamental questions the answers to which should be available to foundrymen other than through bitter experience. Steel foundrymen have recognized the importance of such research projects—why are not bronze foundrymen doing the same?

EFFECT OF POURING TEMPERATURE ON 85-5-5-5 TEST BARS

(*Continued from page 88*)

clay-graphite crucible, produced substantially lower test bar properties than the induction furnace with the same type of lining.

Effect of Pouring Temperature—The effect of pouring temperature on the test bar properties of the four different designs previously listed and the horizontal 5/8-in. web Webbert are graphically represented by Figs. 14, 15, 16, 17, and 18. These figures represent, respectively, the horizontal 5/8-in. web Webbert, the L. T. B.-2, the modified 5/8-in. web Webbert, the Navy 5/16-in. web Webbert, and the Navy 5/8-in. web Crown test bars. On each of these five figures, a sketch of the test bar design and curves representing the relation of the tensile properties to the pouring temperature are shown. On each figure, one set of curves illustrates the average effect of pouring temperature when the test bar was poured from the three melts of very poor quality, and one set represents the average effect when the test bar was poured from the 27 melts of good to excellent quality. The other lines on each of these curves represent typical variations of individual heats. It is generally believed that each test bar design has an optimum pouring temperature at which it will produce the highest tensile properties. A glance at figs. 14 and 18, inclusive, will show that this is not necessarily true.

The effect of pouring temperature on the tensile properties of the various test bar designs appears to depend almost entirely upon the effect of the pouring temperature on the structure and sound-

(*Continued on page 178*)

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SHAKE-OUT BOOTH

The Uni-Wash Shake-Out Booth incorporates two types of intake ports to present maximum intake area — the center ports and the perimeter port which extends around the outer edge of the intake area.

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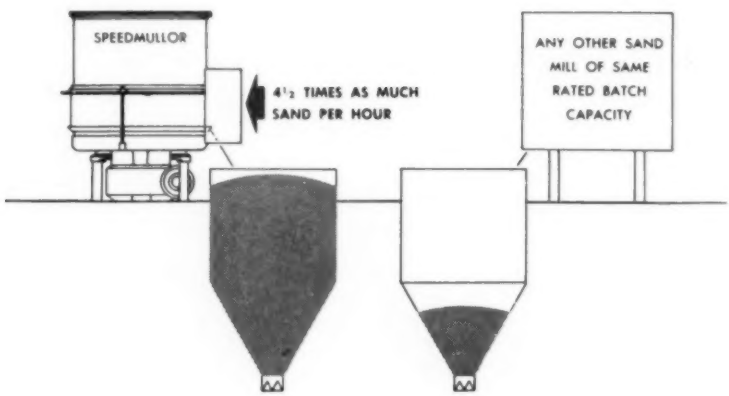

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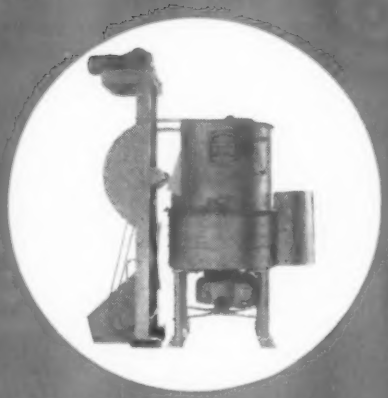

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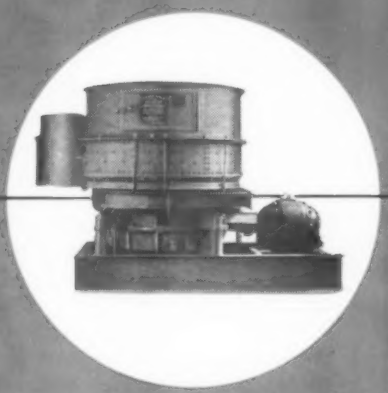

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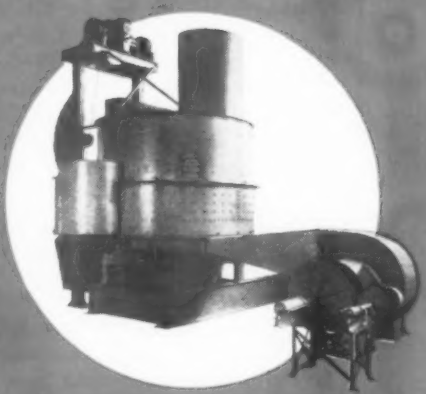

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(*Continued from page* 175)

ness of the bars. This relationship of structure to tensile properties has become fairly clear during the progress of this work and will be considered in detail in future articles of this series. They will deal with the correlation of the test bar design, pouring temperature, and melt quality with the fracture, microstructure, and tensile properties of the test bars.

The various effects of pouring temperature on the tensile properties as illustrated by Figs. 14 to 18 are listed in the summary at the end of this paper.

While the per cent elongation obtained on bars poured from melts of fair to high quality is affected by pouring temperature in various ways, it should be noted that each point representing individual heats is the average value of only two test bars machined from the same casting. It will be shown in a later article that these variations in pouring temperature correlate quite satisfactorily with the structure of the test bars but that the cause of the differences in structure is not precisely known.

Defective Bars—Two types of fracture defects which were observed consisted of (1) dross and (2) fractures through the shoulders of the test bar. The percentages of these defects in the five different designs of test bars poured from the 27 melts of fair to good quality are shown in Table VII. These percentages of defectives may not be precisely typical, since they are based on only 54 bars of each design for each pouring temperature. However, on the basis of the data in Table VII, it will be noted that dross defects increase markedly with decreasing pouring temperature, whereas shoulder fractures increase or decrease depending upon the design of the bar. In general, however, the Webbert-type bars are characterized by more shoulder fractures than the cast-to-shape L. T. B. bar or the Crown-type test bar.

Similar data, not listed here, on the three poor-quality heats melted under a glass slag indicated that the shoulder fractures were much more frequent when the bars were poured from melts of high gas content. There was some indication, also, that the occurrence of dross particles in the fracture decreased considerably with melts prepared under a glass slag, but since there were only six bars of each design for each pouring temperature, this effect has not been conclusively demonstrated. Thus, on the basis of the above data the following conclusions are tentatively drawn:

1. Dross defects increase markedly with decreasing pouring temperature, but for a given pouring temperature their frequency depends considerably upon the gate employed and possibly upon the method of melting.

2. Shoulder fractures, on the other

hand, depend somewhat upon the pouring temperature, but for a given pouring temperature their occurrence increases markedly with increased gas content of the melt.

3. Shoulder fractures are also dependent upon the design, and, in general, they occur more frequently in Webbert-type bars than in cast-to-shape designs.

Summary—A study of the effect of pouring temperature on the tensile properties of five different test bar designs, as graphically illustrated in Figs. 14 to 18, inclusive, shows the following:

1. Tensile strength generally increases with decreasing pouring temperatures for all designs and for all melt qualities. With melts of low quality or high gas content, the tensile strength of the bars is low, but it increases more rapidly with decreasing pouring temperature than with melts of good and excellent quality.

2. With melts having a high gas content, the per cent elongation also generally increases with decreasing pouring temperature, but these elongation values are low throughout the pouring temperature range.

3. With melts of good to excellent quality, the average effect of pouring temperature on elongation is to produce a maximum elongation at the intermediate pouring temperature. However, the effect of pouring temperature on the elongation values of individual heats varies considerably and somewhat erratically, as illustrated clearly by Figs. 14 to 18, inclusive.

4. The usual assumption that each test bar design has an optimum pouring temperature at which maximum tensile properties are obtained should be abandoned, since it now seems clear that the effect of pouring temperature depends markedly upon the melt quality and other individual characteristics of each melt.

5. Cause of the variations in the effects of pouring temperature in terms of its effects on the structure have been fairly well established, but this subject will be considered in a future article.

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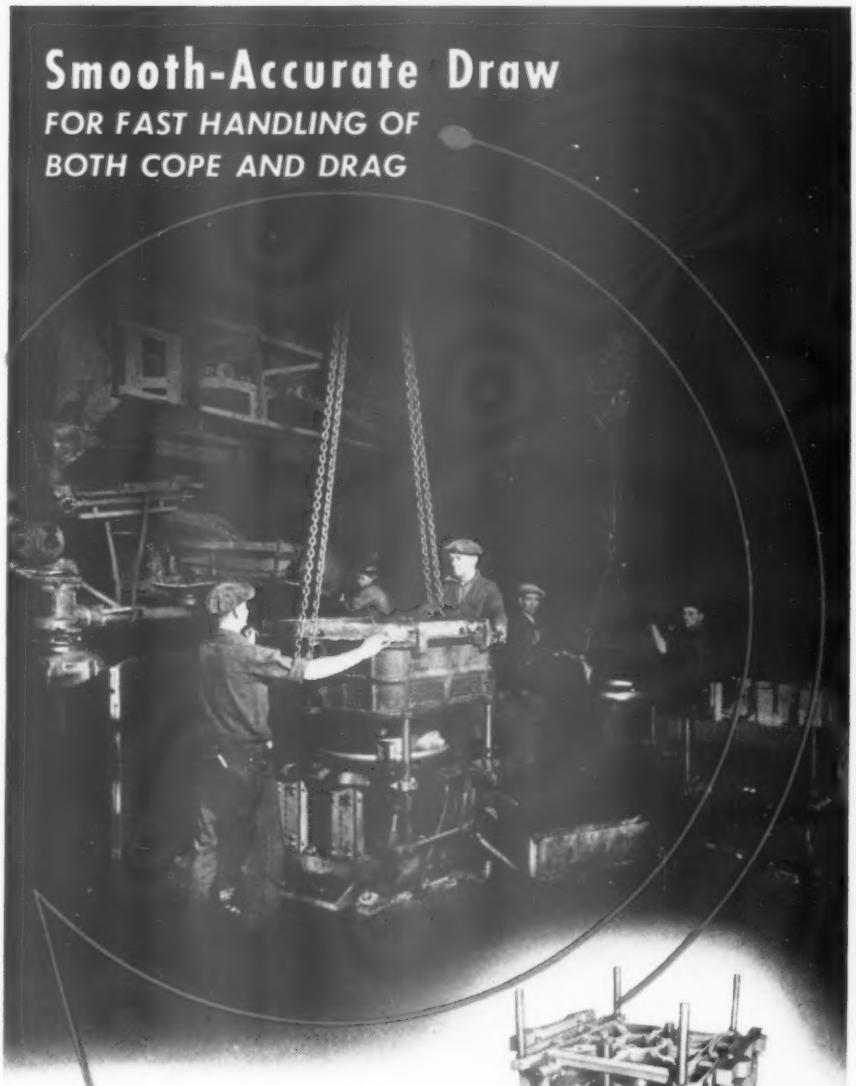

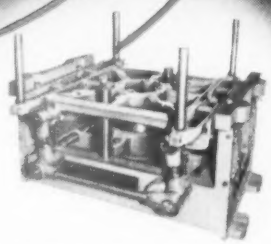

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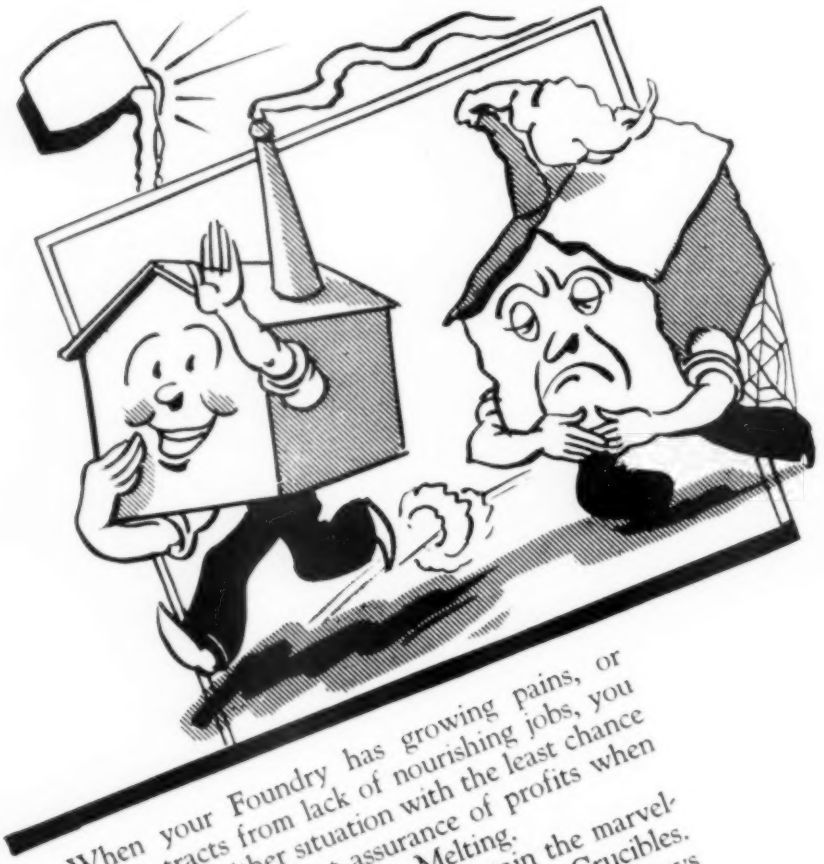

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HOW TO PREVENT SNAGGING WHEEL BREAKAGE

(*Continued from page* 72)

Most of the wheel breakage due to over-speeding can be traced back to the fault of the machine operator—which is discussed later. But occasionally it is due to the machine. Modern machines are generally designed to operate at the correct speeds, but faulty maintenance may alter that.

In one case, investigation of the cause of breakage on a swing frame grinder, showed that the V-belt sheaves had worn to the extent that the belts ran slack. To take up the slack, the maintenance man had fitted the motor with a large sheave, but did not change the wheel sheave. As a result the sheave ratio was raised and the increase in wheel speed was enough to cause the wheel to break. This is another justification of the rule that grinding machine maintenance and adjustment should be the responsibility of a fully competent man.

Check Wheel Speeds

Sheave wear alone, without incompetent tinkering, can raise the wheel speed, and do it so gradually that it goes unnoticed until the wheel breaks. The reduction in diameter of the sheaves, as measured in inches is apt to be the same for both, if both sheaves are made of the same material. Obviously this will reduce the diameter of the smaller sheave more in proportion to its original diameter than it will the diameter of the larger sheave. That, of course, changes the ratio in a way to increase the wheel speed. If the wheel sheave should happen to be made of a softer material than the motor sheave, the result will be the same.

Wheel speeds should be checked frequently, by means of a speed counter and stop watch, or a tachometer. Evidently it is not sufficient to rely on the machine rating or on calculations based on measurement of outside pulley diameters.

Inadequate machine power may cause wheel breakage. When the wheel slows down, flat spots are likely to develop on the face, which cause a bumping action against the work that can result in breakage. Also, the cutting action of the wheel is slowed at lower speed. It is perhaps natural for the operator to try to increase the cutting capacity of the wheel by exerting greater pressure. If the wheel has a narrow face, or if there is any side pressure, the wheel is apt to break under the extra pressure.

Most modern snagging machines are adequately powered when new. How-

(*Continued on page* 182)

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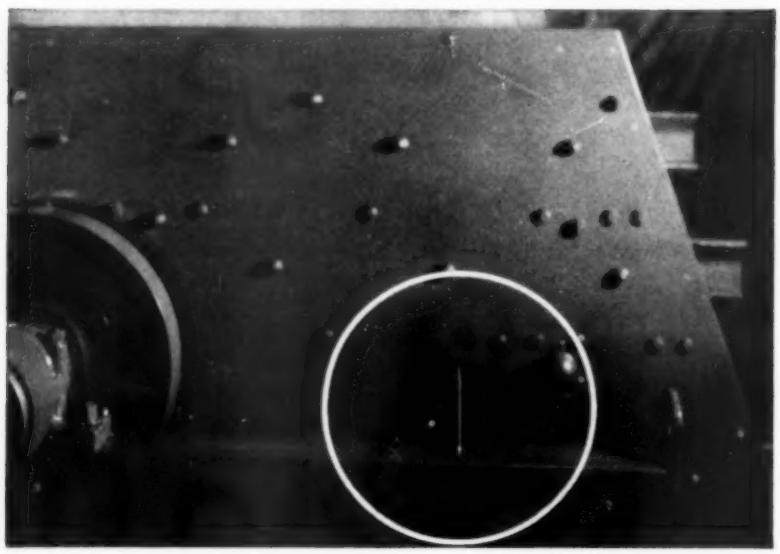

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(*Continued from page* 180)

ever, if the wheel specifications are changed from a free-cutting wheel to a harder grade, the machine may not have enough power for the new condition. Also, belt slippage may prevent a motor of proper size from delivering enough power to the wheel. Prevention of such trouble is an important part of the duty of the competent man who, it has been emphasized, should have full responsibility for grinding equipment.

It may seem superfluous to warn against the use of make-shift machines or doing heavy high-speed snagging on machines not designed for that service, but abrasive engineers who investigate wheel breakage, especially in foundries where there seems to be an epidemic of breakage, are not surprised at anything.

Use Proper Machines

For example, occasionally they find heavy, high-speed snagging wheels mounted on wooden stands designed for low-speed sandstones. The foundations are often merely timbers; bearings usually are the open trough type, and flanges are apt to be small and unrelieved. It would seem that more common sense would tell those foundrymen that a wheel cannot be expected to stand up on such a device—it certainly cannot properly be called a "machine."

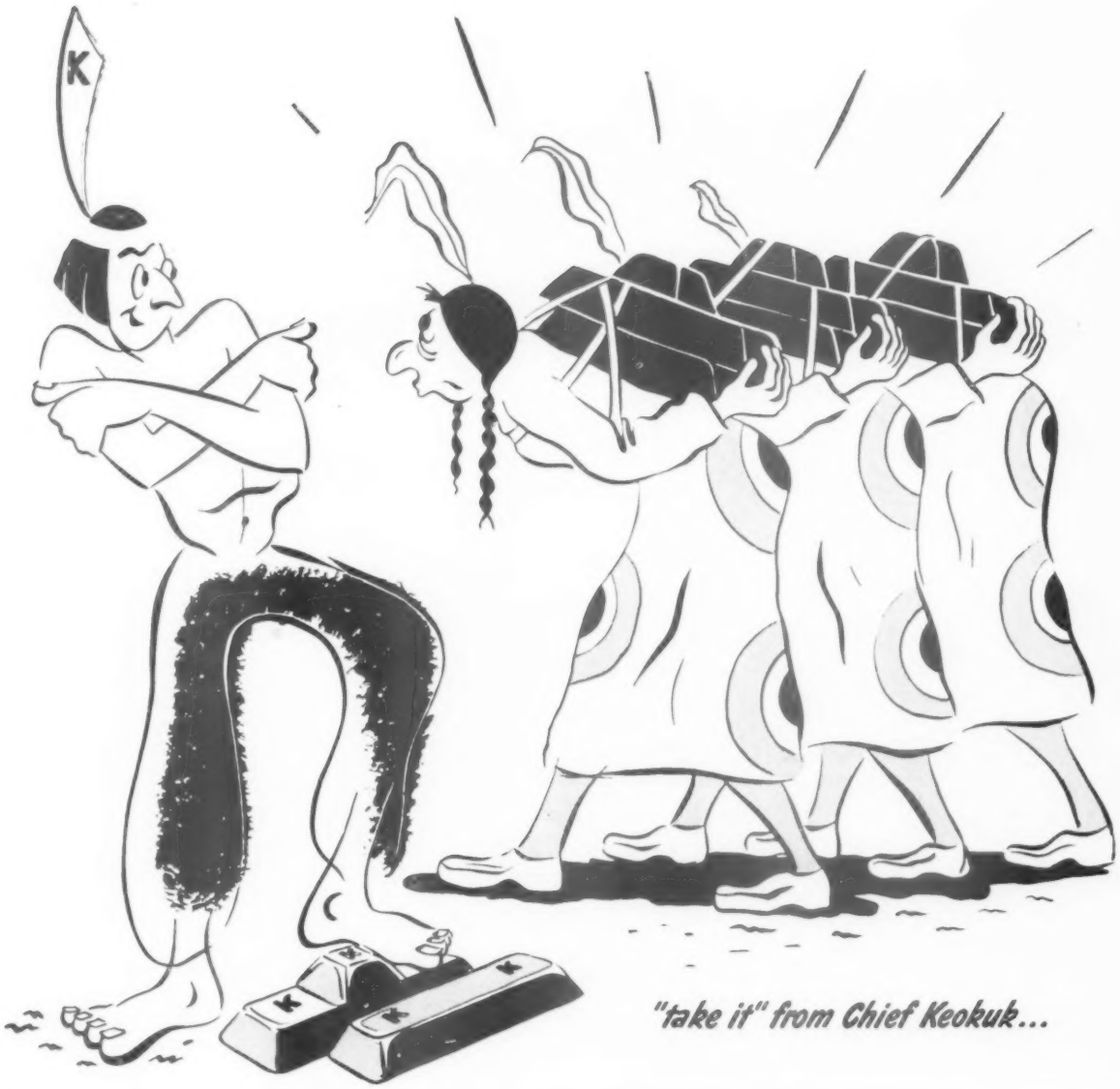
Again, because of a slight family resemblance, some foundries use high-speed polishing jacks instead of floor stand or bench snagging machines. Considering the differences in the stresses set up in polishing and high-speed snagging, that would seem to be the perfect example of sending a boy to do a man's job.

Polishing jacks are designed to carry only light weight polishing wheels or buffs. Therefore the machines are so light that under the heavy load of a revolving snagging wheel, excessive vibration is set up. Their spindles have long overhang, and flanges are small and utterly unsuited to grinding wheels. Many wheels have been broken on such machines.

Most high-speed snagging, using the strong resinoid bond wheels, is now done on machines especially designed to carry the load, but once in a while we find a shop where the new wheels are mounted on the old, light, plain bearing machines which were satisfactory years ago for low-speed snagging. The management is evidently under the impression that all that need be done to convert the old machine to high-speed snagging is to equip it with one of the newer wheels and a set of pulleys to speed up the wheel. Even a modern low-speed machine cannot be made suitable for high-speed work.

The principal causes of wheel breakage from improper grinding practice are overspeeding, too high pressure, heating,

(*Continued on page* 184)



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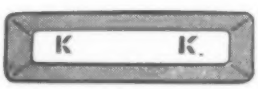

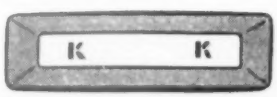

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OTTAWA SILICA COMPANY
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(*Continued from page* 182)

and incorrect application of the wheel to the work.

All straight wheels used for floor stand, bench stand and swing frame snagging have been tested by the maker at speeds which are enough higher than recommended operating speed to make certain that unless the wheel has been subjected to improper stresses before being put in operation, it will stand up at its marked speed.

It should be remembered that the strength of the wheel varies approximately with its grade. Since the absoulte hardness of the wheel of a given marking varies between makers, the Safety Code specifies speeds for wheels of low, medium and hard "strength" instead of by grade.

For straight and tapered snagging wheels the allowed maximum speeds are:

	Low Strength	Medium Strength	High Strength
Vitrified Bond (for low-speed snagging)	5,500 sfpm	6,000 sfpm	6,500 sfpm
Resinoid Bond (for high-speed snagging)	6,500 sfpm	8,000 sfpm	9,500 sfpm

These are maximum speeds—not, as is often assumed, recommended speeds, nor average speeds.

If the grinding machine is of good design and kept in good condition—and only then—they are allowable maximums. Also, being maximums, they should not be exceeded when the wheel is running free without load. While these speeds are set with a sufficient factor of safety to permit a slight increase of speed at no-load, a considerable difference between load and no-load speeds is apt to cause the wheel to break. It is safer to adjust the machine so that the grinding speed will be sufficiently below the maximum allowed speed.

As the diameter of a wheel is reduced by wear it is necessary to increase its rpm in order to maintain a speed high enough for efficient material removal. This can be done by means of a cone pulley on the machine, or by an electrical control. When increasing the speed by these means there is a chance that the jump may be made from the lowest to the highest speed, when it should be made to an intermediate speed. Or, it sometimes happens that when the wheel is finally discarded and a new wheel mounted, the speed will not be lowered to suit the full-diameter wheel.

Another method of getting worn wheels to operate at the higher rpm required is to have some machines set at the proper speed for new wheels and other machines set at speeds suitable for various amounts of wear. The danger here is that an uninformed operator

(*Concluded on page* 186)

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Again Johnston-Jennings leads the field,— with this newly designed Jolt Squeeze machine, having a one-piece cast steel squeeze frame operated automatically by air. This construction minimizes operator fatigue and assures better, less costly and faster production, even with semi-skilled labor.

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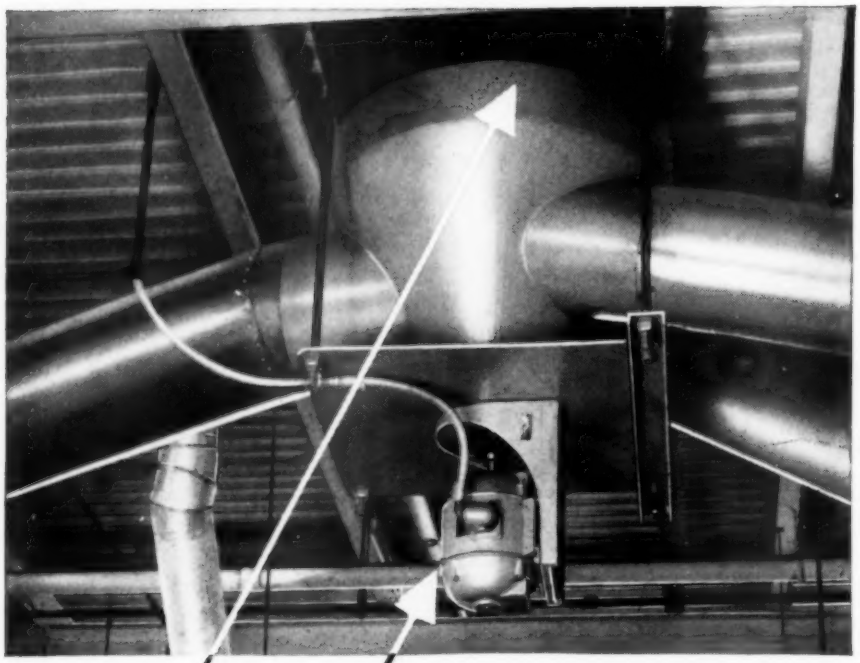

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(*Concluded from page* 184)

will put a new wheel on a machine which has been set at the speed required for a worn one.

To prevent such wheel breakage, it is important that speeds be controlled only by a fully competent man.

Rapid changes in wheel temperature or excessive localized heating set up stresses similar to those caused by centrifugal force and so may cause the wheel to break at speeds lower than those which would be safe under normal operating conditions. In dry grinding such as snagging the likelihood of overheating should therefore be taken into account when setting speeds. It should always be considered when using vitrified wheels, as is usual with low-speed snagging.

Heavy material removal with the wheel almost constantly in contact with the work may cause breakage from overheating. So may forcing the work against a cold wheel. The wheel should be allowed to warm up gradually and evenly.

Although, as we have seen, the strength and therefore the allowable operating speed of wheels increase roughly with their hardness, it must also be remembered that too hard a wheel will heat up more quickly than a softer, freer cutting one. Heat breakage is often traceable to a wheel of proper grade and structure for one job being transferred to another job for which it is not at all suited.

Faulty truing which dulls the face of the wheel will make it act harder than its actual grade, and so overheat to the point where it breaks.

In the second article of this series we shall discuss wheel mounting methods and the proper maintenance of mounts. Many abrasive engineers estimate that faulty mounting is in one way or another the cause of about half of all wheel breakage.

(*To be concluded next month*)

Book Review

Symposium on Atmospheric Exposure Tests on Non-Ferrous Metals, paper, 145 pages, 6 x 9 inches, published by the American Society for Testing Materials, Philadelphia. Price $1.75.

This symposium containing six papers presented at the 1946 Spring Meeting of the American Society for Testing Materials, provides the evaluation and correlation of considerable data derived from long-time, country-wide atmospheric exposure tests carried out under the auspices of Committee B-3 on Corrosion of Nonferrous Metals and Alloys. Materials discussed include rolled zinc, nickel and monel, copper alloys, lead and tin, and aluminum-base alloys. In addition to the papers the book also includes considerable discussion by other authorities.

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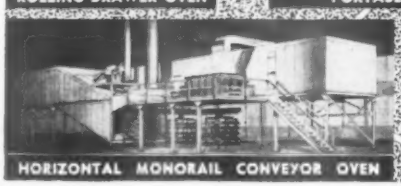
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CORE AND MOLD OVENS

PORTABLE CRANE HANDLES MATERIALS ECONOMICALLY

(*Continued from page 73*)

with the boom in a vertical position—the effective lifting height is about 36-38 ft.

A 40-hp ac electric motor, which is plugged into a 220-v source by a long cable, operates the tractor, lifting cable, swivels the cab and boom, and drives a generator producing 220-v dc for energizing a lifting magnet. The company has 29-in. and 36-in. lifting magnets which are used for handling pig iron, briquets, and iron and steel scrap. The magnets will lift about 800 lb of pig iron and various amounts of scrap, depending upon the size and type. On one occasion a 3500-lb dome shaped piece of steel was lifted a distance of 10 ft to clear a wall while moving a load of scrap. A ¾ cu yd capacity clamshell bucket is employed for handling loose and nonmagnetic materials.

In routine operation the company uses about 2½ carloads of materials daily. This is made up of ½-car of coke, ½-car of sand, 1 car of pig iron and ½-car of scrap, coal or limestone. As cars of coke pig iron, scrap and limestone arrive at the foundry, they are shunted onto a railroad siding running alongside the foundry and back into the storage yard. Cars are unloaded first to fill a supply yard located along that portion of the building which houses the foundry's two cupolas. An overhead crane is used to unload; this crane also is used to handle two drop bottom steel buckets for charging the cupolas. When this yard is filled with the component parts of a cupola charge the cars are moved back into the larger storage yard and unloaded with the portable yard crane. Coke is not handled by either one of the cranes but is forked and wheeled by hand. This is done to avoid as much as possible breaking up the coke.

Unloading a carload of pig iron, which would ordinarily require 5 man-hours can be done with the yard crane in about 1 hour. Because of the length of the crane boom the iron can be piled well back in the yard away from the railroad siding, thus leaving room, should it be needed, for piling additional material. This eliminates the necessity for rehandling the material which would be necessary if hand labor were employed. For instance, in unloading pig iron from a car a man would merely drop the pigs over the side of the car where they would have to be loaded again on trucks to be moved back out of the way.

The same situation exists with scrap. A carload of that material can be unloaded by the yard crane in 1½ to 2 hours, depending upon the size and character of the scrap. It also can be piled well out of the way. When the cupola supply yard needs replenishing the portable crane is employed to load trucks which transport the material with a minimum of handling.

All sand that comes into the foundry is unloaded by the yard crane from the cars spotted on the railroad siding alongside the sand storage bins. A clamshell bucket attached to the crane scoops the sand from the cars, and the crane lifts the sand to the top of the bins where it is dropped through 6 x 10 ft hatches in the roof. Total storage capacity of these bins is about 25 carloads of sand.

The crane can unload a car of sand in 2½ to 3 hours. Hand labor for such an operation would take about 8-10 man-hours. A car of limestone or coal, which is used in the foundry's heating system, can be handled in about the same length of time.

Eliminates Car Demurrage

The reduced amount of time necessary for unloading cars with the crane makes possible an additional saving in money by enabling the company to get empty cars off the siding quickly. The company is permitted 48 hours to release empty cars before being charged demurrage. Starting on the third day, costs for keeping cars overtime increase on a sliding scale—$3 is charged for the third day, $5 for the fourth, $7 for the fifth and $16 for the sixth. On the other hand, credits are allowed on the basis of ½-day credit for each day the cars are released before the expiration of the free 48-hr period.

When not being used for unloading work the crane finds other applications. It is used for carting away containers of refuse from the aluminium flask division of the foundry and loading the containers in trucks which haul it away. Heavy flasks have been moved from place to place in the storage yard. It has been used for unloading heavy machinery delivered to the foundry on cars or in trucks. It can be used for excavation work or grading land.

Last winter an underground pipe broke at Fremont Foundry. The crane was used for digging to the pipe so that repairs could be made. During the digging operation an old concrete wall was encountered which had to be broken up and removed. Pieces of concrete weighing 400 to 600 lb were removed easily by the crane and work was not delayed.

Cost of operating and maintaining the crane is low. It is run by one man, and electricity cost amounts to a maximum of 10 cents per hour of operation.

ACKNOWLEDGEMENT: The Magnesium Association, New York, at its recent meeting at the Seigniory Club, Province of Quebec, Canada, awarded its first president, Edward S. Christiansen, (left) president, Magnesium Co. of America, Chicago, a plaque containing a magnesium casting of the association's seal and a plate engraved with an expression of respect and gratitude. R. D. Taylor, president of the association, made the presentation

---

Kasper Foundry Co., Oberlin Rd., Elyria, O., a gray iron foundry, has been organized by Emil Kasper. The company's new plant measures 70 x 120 ft and with equipment will cost around $80,000.

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History of Canadian Foundry Groups

As a subject of general interest to foundrymen of the United States the following brief summary of two Canadian foundry organizations is presented.

The Canadian Malleable Institute, composed of malleable casting foundries, has operated continuously since its inception on Apr. 25, 1916, over 31 years ago.

From the beginning until Oct. 10, 1945, its chairman was John C. Notman, sales manager of McKinnon Industries Ltd., St. Catharines, Ont., he being succeeded as chairman by H. J. Bassett, manager of the Galt Malleable Iron Co. Ltd., Galt, Ont. Since its commencement, S. J. Frame of Toronto has acted as secretary of the Canadian Malleable Institute.

Gave Close Supervision

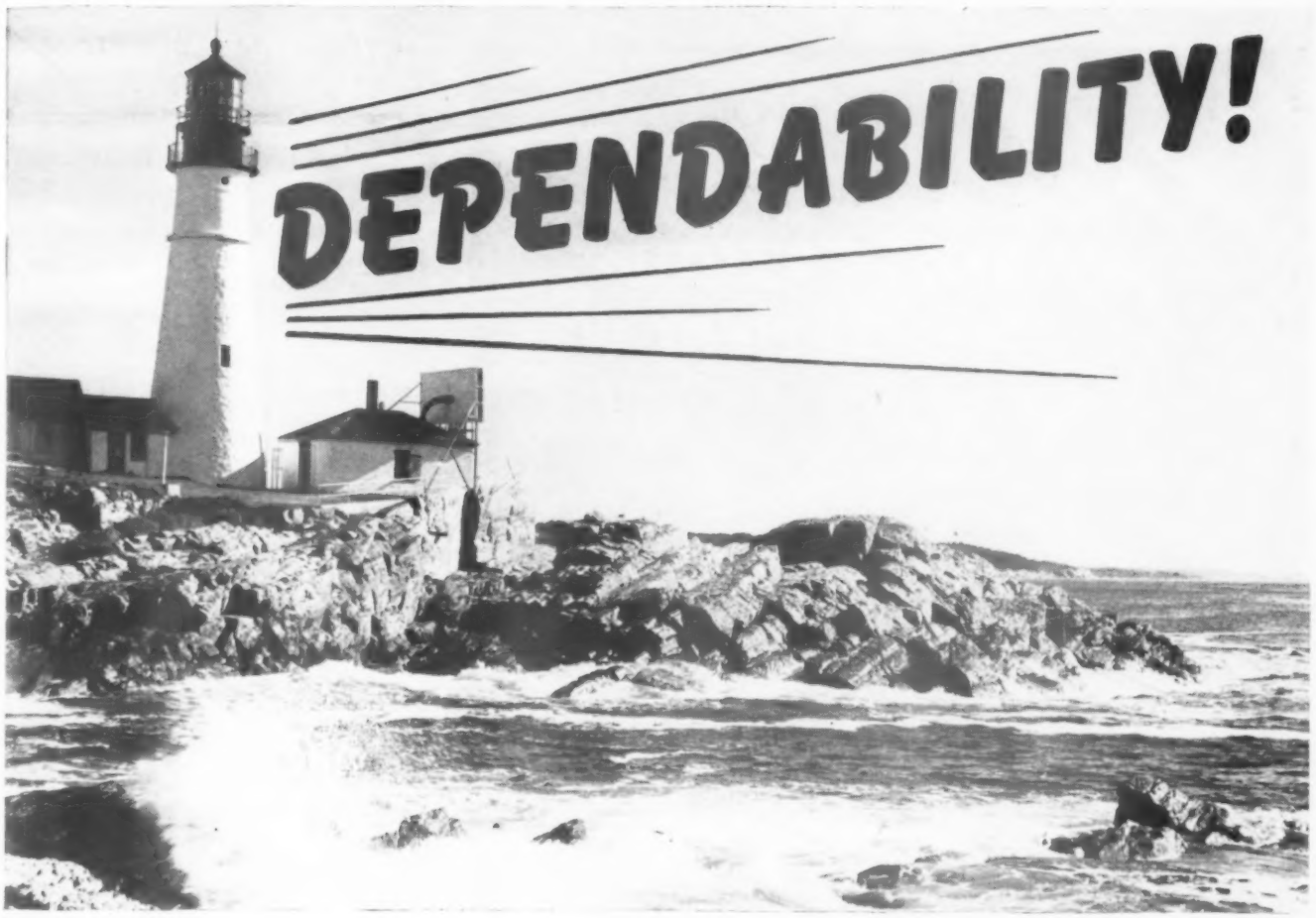
The Canadian Malleable Institute throughout its years of existence, which have included the two World Wars and the great depression, has been a stabilizing influence in the Canadian malleable casting industry. Through the medium of the Canadian Malleable Institute, the Department of Munitions and Supply of the Dominion Government, with W. H. Cantelon, president, Auto Specialties Mfg. Co. (Canada) Ltd., Windsor, Ont., and S. J. Frame, acting as supervisors, exercised a close and effective supervision of the Canadian production of malleable castings.

Throughout the years, the most friendly relations have existed between the institute and Malleable Founders' Society of the United States.

Canadian Founders' and Metal Trades' Association is composed of gray iron foundries, including several foundries which produce both gray iron and malleable castings. This association was incorporated under Dominion Companies Act, Mar. 19, 1920, with supplementary letters patent issued Feb. 23, 1921, and was reorganized with S. J. Frame, of Toronto, secretary, under date May 10, 1937.

The president of Canadian Founders' and Metal Trades' Association is S. C. Evans, managing director, Taylor-Forbes Ltd., Guelph, Ont., his predecessor being Thomas Clough, one-time president of Dominion Wheel & Foundries Ltd., Toronto.

Canadian Founders' and Metal Trades' Association, in its objective of raising the standard of the foundry industry, constantly and steadily exercises a constructive influence, and it has always maintained friendly relations with National Founders' Association of the United States.



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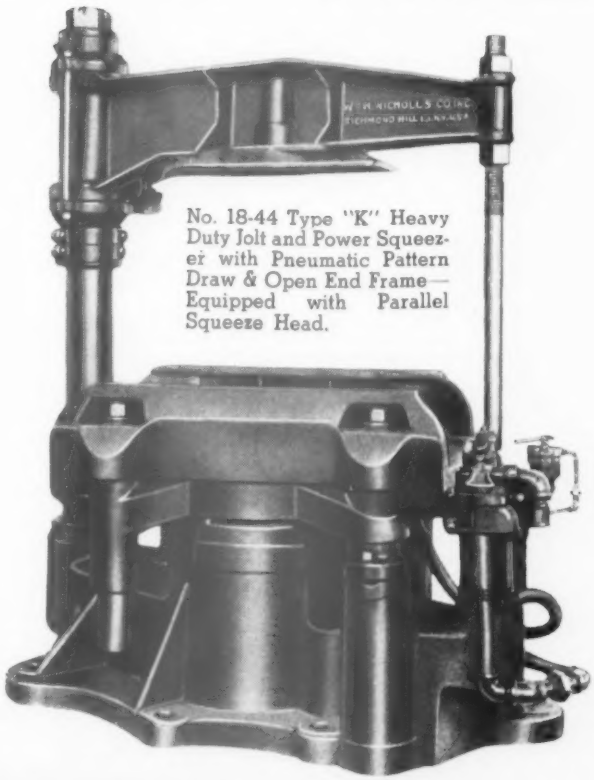

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STUDY CONVECTION CURRENTS IN GRAY CAST IRON

(*Continued from page* 69)

apparent in the bottom-poured cylinders. The degrees of wall taper of the four castings are not strictly comparable since the castings were poured from different heats under varying conditions.

Although there were indications of convection currents in these small cylinders, larger castings were considered to be more suitable for making such observations. It was planned to substantiate evidence obtained by bleeding experiments with measurements of temperatures from thermocouples placed in the mold cavity. A larger mass of metal was considered necessary to retard the temperature changes sufficiently to permit accurate observation and recording of data, so a cylindrical test casting 4-in. in diameter and 24-in. high was adopted.

Minimize Turbulence

The cylinder was poured in a vertical position and the metal was introduced at the bottom by a special gating system that minimized turbulence in the casting. The top of the cylinder was closed by a cope. Platinum, platinum-rhodium thermocouples in quartz protection tubes were located at the longitudinal centerline of the cylinder 4-in. from the top, 7-in. from the top, and 3-in. from the bottom. A high-speed temperature recorder was used for obtaining a continuous record of the thermocouple temperatures. The cooling curves obtained from these thermocouples are shown in Fig. 1. The metal was poured at 2650°F and contained 2.65 per cent C, 2.23 per cent Si, 0.51 per cent Mn, 0.048 per cent S, 0.118 per cent P.

Since the casting was bottom poured, the hottest point in the casting immediately after pouring was at the bottom. Thermocouple No. 3 (located 3-in. from the bottom) indicated 2560°F about 10 seconds after pouring was completed, whereas couple No. 1 (located 4-in. from the top) showed only 2420°F. However, within approximately 1 minute the top and bottom of the casting had reached the same temperature and a few seconds later the top became the hottest and maintained this relative position until the metal passed through the liquidus. After passing through the liquidus, cast iron acts essentially as a solid and the end effect of the sand conducting away the heat caused the top couple to cool below the temperature of couple No. 2. This observed reversal of the hottest metal going from the bottom of the casting to the top within a minute after pouring seems to be direct evidence of

(*Continued on page* 194)

A BUYING GUIDE FOR ABRASIVES

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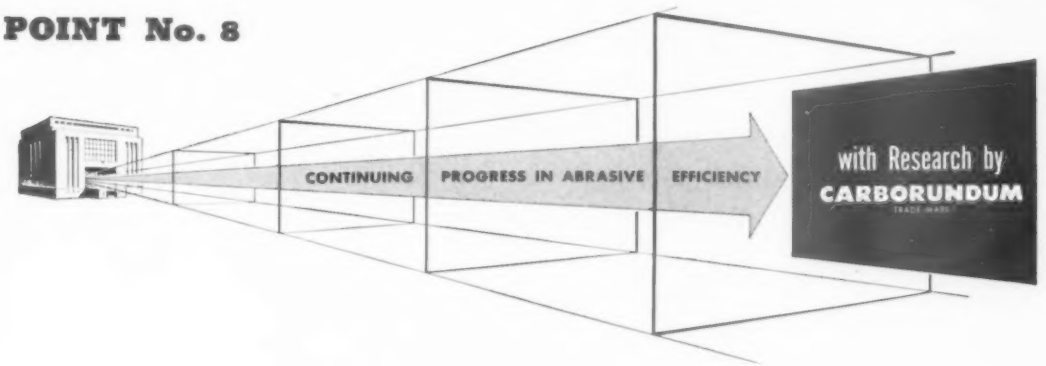

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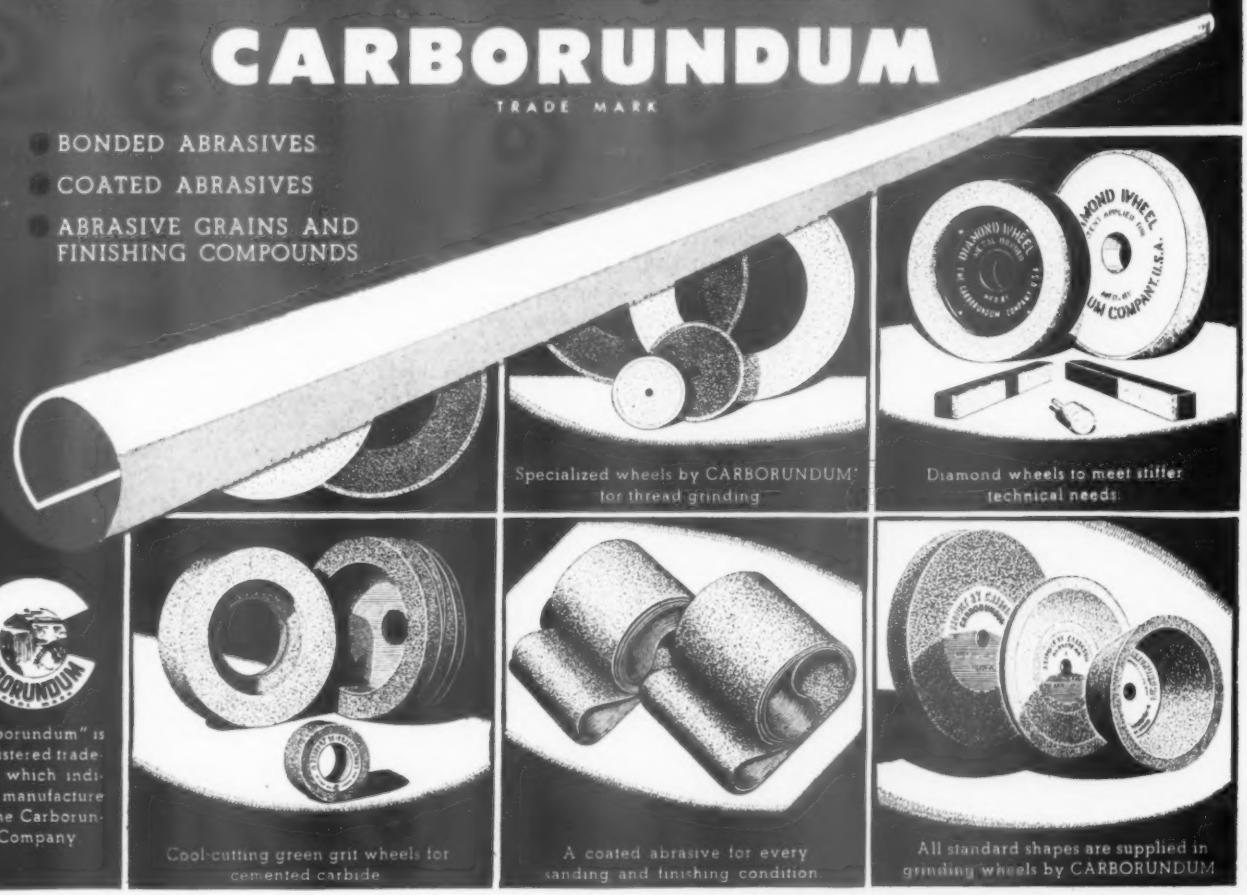

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(*Continued from page* 192)

convection currents acting in the liquid metal.

To prove that this temperature reversal was not an end effect, this type of experiment was repeated with some modification. The casting was enlarged to a cylinder measuring 6-in. in diameter and 32-in. high. Two trunnions were welded on the outside of one of the flasks so that the casting and mold could be lifted and rotated 180° whenever desired. This arrangement is shown in Fig. 5. By rotating the mold during the solidification process, the presence or influence of convection currents could be observed more than once in the casting.

Four thermocouples were used in this test. They were located 2-in. from the top, five-in. from the top, 3-in. from the bottom, and 6-in. from the bottom. The metal was poured at 2650°F and contained 2.76 per cent C, 1.92 per cent Si, 0.45 per cent Mn, 0.024 per cent S, 0.092 per cent P. The cooling curves are shown in Fig. 7.

Flow Is Reversed

Consistent with previous experiments, the hottest metal was initially at the bottom of the casting, but within 30 seconds the top of the casting had become the hottest. As soon as this condition became well established, the casting was rotated 180° and in 20 seconds the hot metal, which had been put at the bottom mechanically by rotation, had flowed by convection back to the top of the casting.

After the iron had passed through the liquidus, the mold was rotated two more times but there was no evidence of convection currents nor any change in the relative temperature conditions in the casting. Below the liquidus cast iron acts essentially as a solid because the remaining liquid metal is isolated in the many small voids existing between the solid dendrites.

Some interesting observations of the shrinkage pattern were made by sawing from the center a one inch thick slab parallel to the longitudinal axis. Fig. 4 shows the upper 6 in. and lower 10 in. of the slab. The position of the thermocouples and ingate may be noticed on the outer edge of the slab. The upper 6 in. of the casting reveals the original tucking or sinking of the metal at the top of the cylinder during the initial stages of solidification. The pattern of this sink is outlined clearly by sand which adhered to the molten iron when original contact was made at the time of pouring. When the casting was rotated 180°, liquid iron broke through the hottest and weakest point at the center of this sink and refilled the cavity created by shrinkage. The appearance of the lower 10 in. of the slab might possibly be attributed to the effects of shrinkage and other internal forces during subsequent rotations of the casting.

A similar experiment was made with an iron of higher carbon equivalent in order to allow more time in which to manipulate the casting before reaching the liquidus temperature. The metal was poured at 2450° F and contained 3.99 per cent C, 1.72 per cent Si, 0.67 per cent Mn, 0.019 per cent S, 0.157 per cent P. Fig. 8 shows the cooling curves. Since the liquidus of this iron was 2100° F, sufficient time was available for rotating the casting 180° three times to observe the effect of convection currents with each reversal before they ceased to act. As expected, the bottom of the casting was initially the hottest, 2400° F, and the top the coldest, 2305° F. At approximately 2 minutes the top became the hottest. Two and one half minutes after pouring, when this condition became thoroughly established, the casting was rotated 180°. Another temperature reversal then took place at approximately 3 minutes (elapsed time after pouring). Rotation was made a second time at 4¾ minutes and temperature reversal was completed for the third time at 5¾ minutes. The third rotation followed at 8½ minutes and the temperatures crossed at the liquidus, 9 minutes after pouring.

This experiment shows conclusively that hot metal flows from the bottom of a casting to the top by the mechanism of convection currents.

Since observations thus far had been limited to cylinders with diameters ranging from 2½ to 6 inches, an experiment was made to establish the minimum cross section in which convection currents could cause temperature reversal.

Four cylinders were bottom poured simultaneously from the same runner gate at 2600° F (370° F above the liquidus). These cylinders were 10 in. high and 1, 1½, 2 and 2½ in., respectively, in diameter. Thermocouples were placed 1½ in. from the bottom and 3 in. from the top of each cylinder. A carbonaceous anti-piping compound was put on top of all cylinders upon completion of pouring. The metal contained 3.03 per cent C, 2.19 per cent Si, 0.38 per cent Mn, 0.41 per cent S, 0.148 per cent P.

Fig. 2 is a plot of the cooling curves which were obtained. The 1-in. diameter cylinder passed through the liquidus before convection currents were able to act sufficiently to equalize the temperature gradient existing between the metal at the top and bottom of the cylinder.

The cooling rate in the 1½-in. diameter cylinder was slow enough to allow convection currents to raise the temperature of the colder metal in the top of the cylinder until it exceeded the temperature of the metal in the bottom. Curve 2*B* shows the initial temperature at the bottom to be 2410° F compared with 2320° F at the top (Curve 2*T*). Within 20 seconds the temperature was the same at top and bottom and thereafter the top metal remained the hottest.

The 2-in. and 2½-in. cylinders had a temperature reversal about 25 seconds after pouring.

Conditions Vary Effect

As previously observed, temperature reversal must take place before the liquidus is reached. Of interest also is the depression of the solidus by supercooling. Curve 1*T* shows a solidus at approximately 2005° F, while curves 3*T*, 4*T*, and 4*B* indicate the more true value of 2090° F.

Convection currents are influenced not only by the cross section but also by the height of the casting. Observations of the effect of height were made by bottom pouring simultaneously four cylinders measuring 3 in. in diameter and 3, 4, 6 and 8 in. high, respectively. As in the preceding experiments, cooling curves were obtained from thermocouples placed 1 in. from the top and bottom of all castings, which were completely enclosed in sand. In the 3, 4 and 6 in. high cylinders, the top couples read the hottest at all times. In the short cylinders the metal at the top and bottom probably are initially at the same temperature because of turbulence during pouring. Convection currents very rapidly establish a hot top before the relatively sluggish thermocouples can indicate the original temperature distribution. In the 8-in. high cylinder the bottom couple was the hottest for only about 20 seconds before reversal took place. Although only 1-in. of metal separated the two thermocouples in the 3-in. high cylinder, the

(*Continued on page* 198)

J. H. Schaum, the author of "Convection Currents in Gray Cast Iron," was born in Youngstown. He received a bachelor of science degree in metallurgical engineering from the Massachusetts Institute of Technology in 1940. Upon graduation he worked as a metallurgist for the Lewis Foundry & Machine Co., Pittsburgh, Babcock & Wilcox Co., Barberton, O., and the Bureau of Mines at College Park and Washington. In June, 1944, he joined the staff of the Physical Laboratory, Washington, as research metallurgist.

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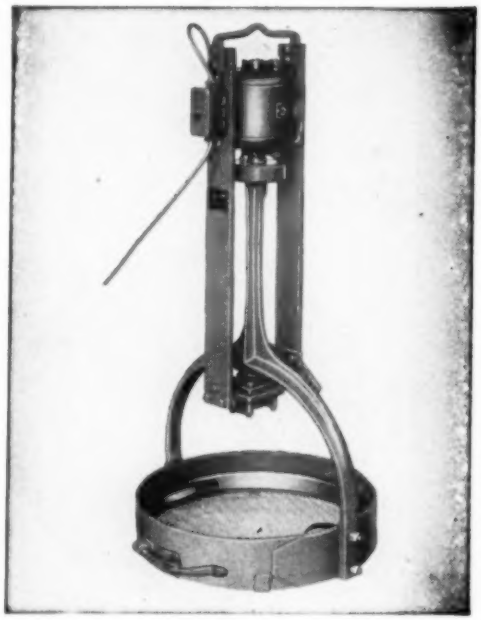

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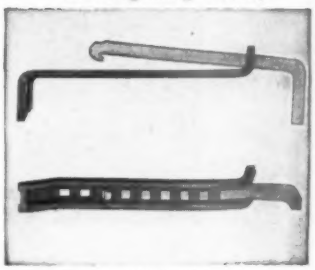
The "Lightning" Clamp



The "Holdtite" Clamp

Federal offers two types of flask clamps.
The "Lightning" clamp is an eccentric type, requiring no wedges and available in two sizes: No. 2, 8" to 12" and No. 3, 12" to 20".
The "Holdtite" is an adjustable clamp designed for use with wedges and is also offered in two sizes: No. 1, 13" to 23" and No. 0, 18" to 33".
Both clamps made of sturdy malleable iron, rigidly reinforced to prevent distortion.

MEMBER

SWABS—We have eliminated the shortage of this essential item by making them ourselves. Federal swabs are made of the best flax, ample in size and won't fall apart. They're fully eighteen inches long and full-bodied. Shipped from stock — the supply is ample. Jobber inquiries are invited.

THE FEDERAL FOUNDRY

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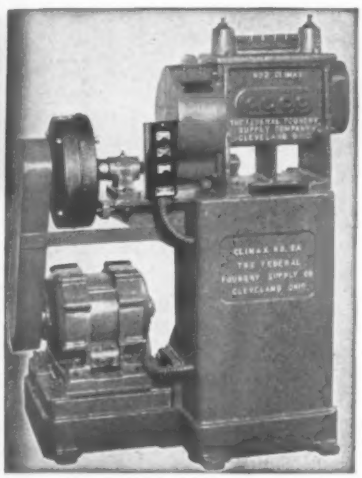
Chamberlain Co., Los Angeles, Calif. · Pacific Graphite Works, Oakland, Calif. · LaGrand Industrial Supply Co., Portland, Ore.

Are Sold with Service"

SUPPLIES



CLIMAX WIRE STRAIGHTENERS

Any foundry, large or small, can cut production costs by straightening and re-using core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely — by unskilled labor. A complete descriptive circular is yours for the asking.

"The Twist Does The Trick"

TWISTED STEM CHAPLETS

The chaplet with everything. The "Twisted Stem" promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

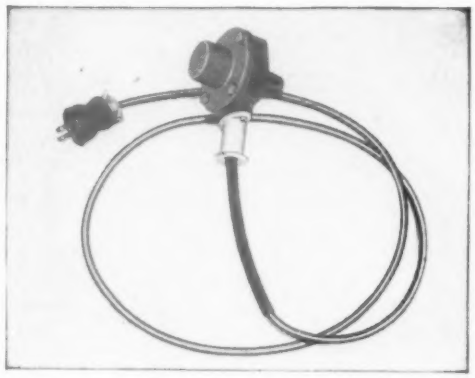
FEDERAL'S WONDER CUTTERS

Two compact cutters for rods and band iron. One cuts up to 5/8" round and the other to 7/8" round. Readily mounted on any bench. Users say they're worth their weight in gold!

WATER BRUSH

Easy to Grip and Hard to Tip. It can't leak and one filling lasts all day. Does not tire the molder's hand.

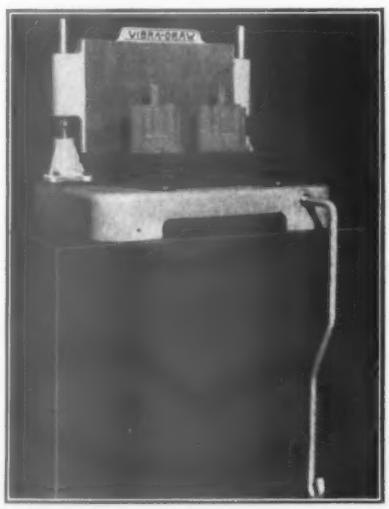
FEDERAL VIBRATORS



Popular electric vibrators, made in our own machine shop and carried in stock for prompt delivery. Hard-chromed piston guarantees long life. For 110 volt, 60 cycle, single phase operation. No. 2 size, $15.60 each; No. 5 size, $20.40 each, f.o.b. Cleveland. A companion knee switch of our own manufacture is also carried in stock; $3.60 each, f.o.b. Cleveland, Ohio.

FEDERAL'S "VIBRA-DRAW" CORE DRAWING MACHINE

Cuts costs in your core room by making it easy for every core maker to draw perfect cores as fast as he can fill the core box, place it against the vibrating head and lift the box. Made in two styles: the floor model and the portable bench model shown below. Immediate delivery—write for details.



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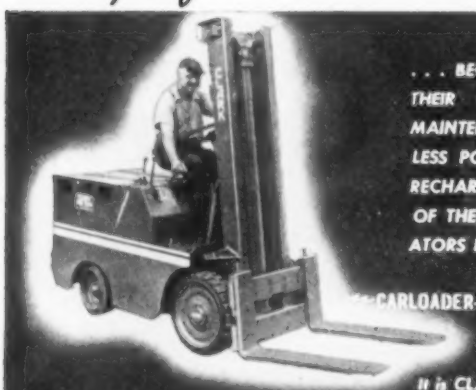
TRUCLOADER—CAPACITY 1,000 lbs.

CLARK *Electric Fork Trucks are unexcelled!*

...BECAUSE OF IMPORTANT CLARK-PIONEERED DEVELOPMENTS IN ALL MODELS—AMONG THEM: COMPLETE HYDRAULIC LIFT SYSTEMS—36-VOLT DRIVE MOTORS—COMFORTABLE SEATS FOR DRIVERS—AUTOMOTIVE TYPE CONTROLS AND STEERING—4 SPEEDS FORWARD, AND REVERSE—BATTERY CAPACITIES RICH IN RESERVE POWER—UPRIGHTS FORMED FROM STEEL PLATE.

CLIPPER—CAPACITY 2,000 lbs.

Users prefer CLARK *Electric Fork Trucks!*



. . . BECAUSE THEIR INITIAL COST IS LOW—THEIR OPERATING COST IS LOW—THEIR MAINTENANCE COST IS LOW—THEY CONSUME LESS POWER AND DO MORE WORK BEFORE RECHARGING IS NECESSARY . . . AND BECAUSE OF THEIR EASE OF OPERATION, MOST OPERATORS PREFER THEM.

CARLOADER—CAPACITY 4,000-5,000 lbs.

It is CLARK'S business to know and to give YOU the answers to materials handling problems . . . Talk to CLARK! Talk Electric-Power; talk Gas Power—Clark's recommendations are unbiased because CLARK makes BOTH—and BOTH are the BEST that are made.

CLARK
Electric
FORK TRUCKS

UTILITRUC—CAPACITY 6,000-7,000 lbs.

CLARK EQUIPMENT COMPANY
TRUCTRACTOR DIVISION, BATTLE CREEK, MICHIGAN
OTHER PLANTS—BUCHANAN, JACKSON, BERRIEN SPRINGS, MICHIGAN

(*Continued from page* 194)

top couple showed a maximum of 30° F above the bottom couple for the first 30 seconds after pouring.

Still another variable, the effect of pouring temperature, must be considered in predicting the action of convection currents. If a casting is bottom poured at a low temperature, it may pass through the liquidus before convection can bring about temperature reversal, and solidification will proceed from the top downward. Observations of the effect of pouring temperature were made by bottom pouring three duplicate cylinders at three different temperatures from the same ladle of metal. The cylinders were 3 in. in diameter and 10 in high with thermocouples placed 1½ in. from the bottom and 3 in. from the top. After the liquidus of the metal was determined to be 2210°F, the three cylinders were poured at 2560° F, 2460° F, and 2310° F. The cooling curves revealed that convection currents were able to effect temperature reversal in the first two castings before the metal cooled to the liquidus but in the cylinder poured at 2310° F (only 100° F above the liquidus) the metal at the top remained 10° F colder than the bottom throughout solidification.

In the preceding experiments the occurrence of convection currents was clearly shown. Within certain limitations of section size, they are able to function until the iron has passed through the liquidus, after which its pseudo-solid structure of bridging dendrites prevents their occurrence. The period of time during which convection currents can act is ordinarily much longer for gray iron than for steel because the former is usually poured with more superheat above the liquidus temperature. Within reasonable limitations gray iron castings will solidify from the bottom upward independent of any gating system. Risers placed on top of iron castings can be smaller and function more efficiently because of the upward flow of heat from the casting to the riser by convection currents.

Summary and Conclusion: The major points established in this paper are:

1. Convection currents are of sufficient magnitude and act long enough in gray iron castings, bottom poured with 370° F superheat, to cause the hottest metal to flow from bottom to top in sections as small as 1½ in. diameter and as much as 10 in. high. When the diameter is increased to 3 in. with the same height, only 250° F superheat is required to effect temperature reversal.

2. In castings 3 in. in diameter and less than 8 in. high, the top becomes hottest in less time than can be observed with thermocouples and solid-

(*Concluded on page* 200)

Why Smith L-O Core Oil is Deserving of Your Consideration

Greater workability, accurately shaped cores, and consistently uniform castings are attributes of Smith L-O Core Oil . . . the *only* core oil subjected to the modern Dow-Therm method of heat treatment. This vitally important process — which replaces old-fashioned direct fire methods — enables us to provide core oil that is thoroughly uniform and homogeneous . . . affords us the opportunity to rigidly control every batch produced.

Allow us to place your purchase of core oil on a competitive basis, even though you are satisfied with your present source of supply. The record of service which we have established with others indicates that a thorough consideration of Smith L-O Core Oil may prove mutually beneficial. Write, phone, or wire the Smith representative nearest your foundry.

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CORE WASH ROD DIP LIQUID PARTING

Smith L-O Core Oil

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- Southwest Foundry Supply Co. Houston 7, Texas
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SMITH OIL & REFINING CO.

INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

(*Concluded from page* 198)

ification proceeds from the bottom upward.

3. For castings gated and risered so as to benefit from convection currents, the pouring temperature of the metal must be sufficiently high to allow convection currents to take effect before cooling below the liquidus temperature.

4. When the temperature of gray iron has dropped below the liquidus, the metal acts essentially as a solid and convection currents cease to act.

5. When the convection currents are sufficiently active in castings to cause the top of the casting to become hottest, top risers should be used. In such cases side risers are not desirable because directional solidification toward the riser will not be obtained.

Bibliography

1. B. Gray, "The Side Feeding of Steel Castings," Paper No. 10/1944 of the Steel Castings Research Committee, the Iron and Steel Institute (British).

STEEL CASTING INDUSTRY

Shipments for 1946 Analyzed

TOTAL shipments of steel castings during 1946 amounted to 1,432,049 short tons, according to a detailed report issued by the Bureau of the Census, Washington. These shipments were 26 per cent under the 1,942,477 tons shipped during 1945, but were approximately double the 821,720 tons produced in 1939, the last year previous to 1945 in which complete coverage of the industry was obtained.

The decrease from 1945 to 1946 is accounted for by the higher rate of monthly activity during the first half of 1945 due to war orders. Average monthly shipments during 1946 were not much different from those during the second half of 1945.

Statistics on shipments and unfilled orders given in the 13-page report are broken down into grade of steel, type of furnace and disposition of castings by months and by geographical districts. Information on total shipments by grade of steel, type of furnace and disposition is given in the accompanying table.

Information on the distribution of shipments by size of foundry is presented in the chart reproduced here. Although 334 foundries reported shipments of steel castings during 1946, most of these are small and contributed little toward the total tonnage. The 144 smallest accounted for 73,112 tons of castings or a little over 5 per cent to total shipments. Of these 144 small foundries, 121 shipped less than 1000 tons each during the year.

Approximately 38 per cent of total shipments, or 549,048 tons, were made by the 20 largest foundries. The 33 largest foundries, shipping more than 10,000 tons each, contributed almost half of the total.

Monthly shipments during the year varied from a low of 60,604 tons in February to 146,608 tons in April. Shipments fluctuated widely during the year, showing no definite trend. Activity at the end of 1946 was greater than that at the beginning and also somewhat ahead of the last few months of 1945.

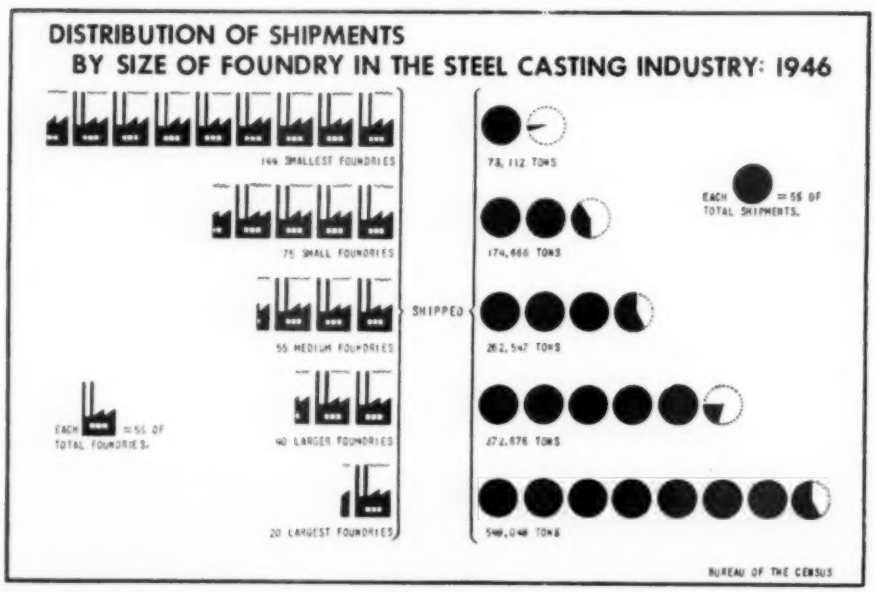
The unfilled order position was much more stable throughout the year than shipments. Unfilled orders for steel castings on Dec. 31, 1945, amounted to 336,303 tons. Orders increased to a peak of 406,401 tons on March 31, and then declined to 362,787 tons at the end of 1946, which was 10 per cent below the March 31 level, but 8 per cent higher than at the end of 1945.

Steel castings were produced in 36 states during the year, although most shipments were made from the Middle Atlantic and East North Central States. These regions shipped 1,177,661 tons or 82 per cent of all steel castings shipped during the year. Pennsylvania, Ohio and Illinois, in that order, were the three largest producers, shipping 398,492, 215,815 and 203,941 tons, respectively, and accounting for more than half of the total steel castings shipped.

The steel foundries covered by this report include both those producing for sale to the trade and those producing for their own use. Tonnages used in compiling the statistics in this report are the weights of the rough castings, before machining, but excluding the weight of gates, risers, sprues and the weight of metal lost in tumbling and sand blasting.

SHIPMENTS BY GRADE OF STEEL, TYPE OF FURNACE AND DISPOSITION

Distribution	1946 Quantity (short tons)	1946 Per Cent	1945 Quantity (short tons)	1945 Per Cent
TOTAL	1,432,049	100.0	1,942,477	100.0
Grade of steel				
Carbon steel	1,112,243	77.7	1,434,473	73.8
Alloy steel	319,806	22.3	508,004	26.2
Type of furnace				
Electric	691,098	48.3	900,600	46.4
All other	740,951	51.7	1,041,877	53.6
Disposition				
For sale	1,043,358	72.9	1,484,957	76.4
For own use	388,691	27.1	457,520	23.6



Issues Management Bulletins

American Management Association, 330 West 42nd St., New York 18, has available a series of bulletins pertaining to various phases of office administration and management. "Streamlining Office Methods and Layouts," is obtainable at $1. "Incentives and Work Standards in the Office," "Administering the Office Union Contract" and "Training and Coordination in the Office" are obtainable at 75 cents, and "The Characteristics of Salary Grades" at 25 cents. The association also offers "Manual of Employment Interviewing," to members at $1.50, non-members $2.25.

40 to 1 with Bayflex*

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These are typical performance reports

we suggest you do a little arithmetic

Your Question:

If one Bayflex disc outperforms the ordinary coated abrasive disc 40 to 1, how much will I save per year?

In your calculation you may neglect the cost of our disc wheel. Its cost is completely absorbed in the waste time saved in changing 39 ordinary discs. Yes, turned into dollars, the saving in labor cost for slacking 39 nuts, removing 39 ordinary discs, replacing 39 ordinary discs, tightening 39 nuts — gives you our disc wheel free. Please do the arithmetic. The chances are better than 40 to 1 it will pay you handsomely to buy Bayflex.

Standard sizes in a range of grits available for stock shipment. Send for descriptive literature and prices.

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BUILT-IN FLEXIBILITY — PLUS FOR MAXIMUM SAFETY AND CUTTING SPEED

Unexcelled for cleaning castings.

For welds on angle- iron frames.

For hard-to-get-at places.

Hundreds of uses in auto repair shops

Has no equal for smoothing welds.

BAY STATE

*Reg. U. S. Pat. Off. (Resilient Abrasive Wheels Mfd. by Bay State Abrasive Products Co.)

Top Performance Consistently Duplicated

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The adventures of BILL

By PAT DWYER

Drawings by RICHEY

"I SUPPOSE," Bill said the other night, "it is too late to think of it now, but do you know what I would do if I had the chance to start life over again? I should write me a book or two, gather in a few hundred thousand smackers from the publishers and possibly even a larger amount from the movie people. With a few barrels of the Stuff all safely salted away, even after our kind and paternal government had stretched forth its long, hairy hands and nipped a few barrels, I could build a home in the West, wear a succession of fancy vests, and let the rest of the world go by."

"'Tis a noble ambition," I admitted, "and apparently within the capacity of any ordinarily intelligent person. All the prospective author needs is a pen, a pencil or a typewriter and a few sheets of paper. The work is greatly facilitated if the writer has an idea or two, plus the necessary skill and patience to set down one word after another in orderly and proper sequence and in a reasonably straight line. The necessary skill may be acquired easily through constant practice. I have been told by reasonably reliable people that the job of capturing and developing an idea is slightly more difficult.

"In former days writers and molders and presumably other young men engaged in less worthy occupations, served a long, gruelling apprenticeship before they were considered competent to handle a job. In recent years molders and other skilled operators have been popping out of the training course bushes after a brief period of incubation or maybe a shot in the arm. It is only fair to assume that writers can be developed in the same miraculous modern manner.

"Ever since old blind Homer set the pattern of a doughty hero overcoming tremendous odds and battling his way to victory on the windy plains of Troy, and his even more remarkable deeds of derring-do on the voyage back to Ithaca, ever since that time fiction writers have built up their masterpieces on the good old standard theme *Hero Is Confronted by Apparently Insurmountable Obstacle. Hero Throws Obstacle in the Garbage Can!* The pattern is varied to some extent by the introduction of characters ranging from the impossible perfection of the heroine, to the equally impossible villain, the dirty dog, engaged day and night brewing big, black and bitter medicine at the cross roads.

"In recent years the stories deliberately and cunningly are designed for reproduction on the silver screen. For the benefit of the reader and later for the primitive and atavistic pleasure of the spectators, the chain of events, more or less skilfully is built up to the smashing climax where the hero and the villain (quote) *Slug It Out Man To Man.* The slugging match almost invariably is staged in a saloon, where the battlers, heavily armed, first salute each other in highly uncomplimentary terms. Of course these terms are not used in the screen version. Only those who have read the book have the pleasure of learning the exact sulphuretted hydrogen words employed by underworld characters. Stern guardians of public morals carefully screen all the coarse and objectionable material from the movie version. Why this should be tolerated, why one section of the population should be protected from contamination while second section can browse blissfully through highly contagious material, is one of the seven mysteries of the world.

"After I have figured this one out, I shall take time out some day to contemplate in a reasonably calm and detached manner another feature that up to now has left me guessing. Each jousting knight carries a heavy gun on each hip. The guns presumably are loaded, and the holsters swing freely from a brass-studded leather belt bristling with cartridges, or cartriges, to use the proper and local western vernacular. Accustomed to the use of these lethal weapons from the days of their childhood, nimble and quick on the trigger and able to shoot the pips out of a playing card as far as they could see it, one naturally would suppose that the artillery immediately and automatically would be brought into action. Kindly remember that each gent bitterly hates the other. No. 1 because No. 2 constantly has pestered him and never lost an opportunity to set out spring nooses, deadfalls, concealed pits with sharpened stakes in the path. No. 2 because No. 1 cunningly has

(*Continued on page 204*)

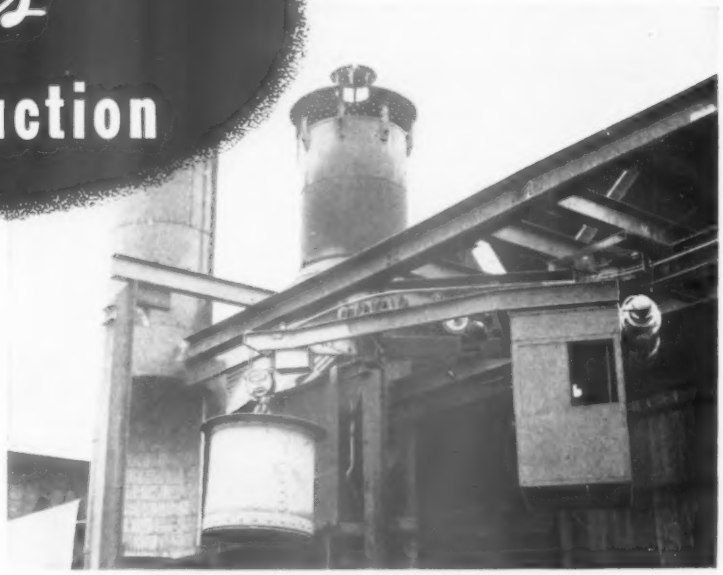
The picture invariably fades out just as the spectators are convinced the next wiggle will shed pants and shirts

MONORAIL HANDLING *Improves* Foundry Production

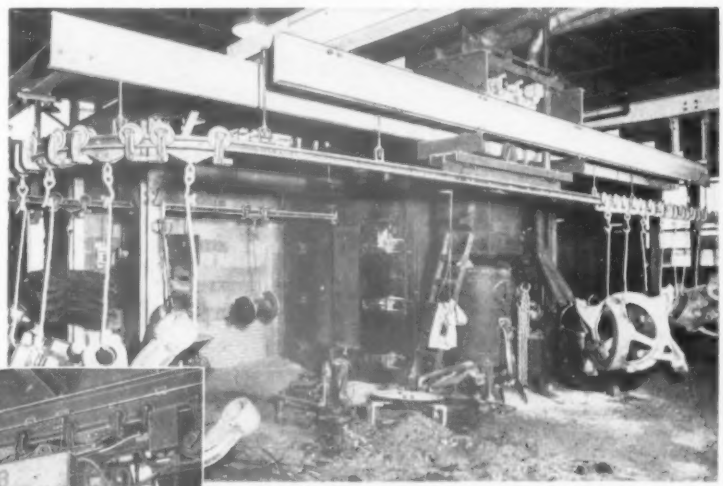
American MonoRail Overhead Handling Systems have eliminated much of the floor congestion typical in foundry operations.

With "Up and Over"★ type of handling, from cupola to shipping, an overhead track or crane system does a better, quicker job with less maintenance.

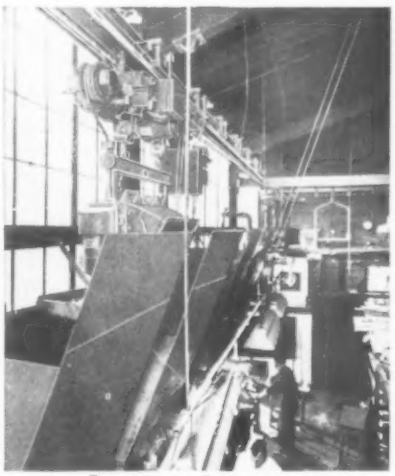
Let an experienced MonoRail engineer explain complete advantages with no obligation, of course.



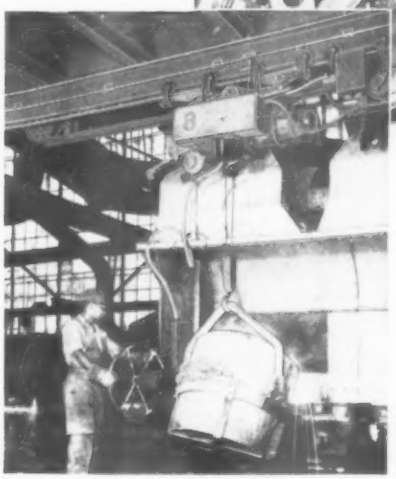
Mechanized charging brings better metal.



Heavy castings move easily on MonoRail through sandblast.



Automatic delivery of sand to core benches.



All labor mechanized for pouring engine blocks.

★"Up and Over" is the title of our 16 MM, sound, twenty minute movie..gladly loaned upon request.

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A practical book telling how to reduce cleaning expenses by application of proved methods.

In three parts: Part one covers Nozzle Blast Cleaning Equipment; Part Two, Mechanical Impact Cleaning: Part Three, Ventilation of Impact Cleaning Equipment . . . all profusely illustrated and cross-indexed for easy reference. "Impact Cleaning", $7* postpaid.

MODERN BLAST CLEANING AND VENTILATION . .

by: C. A. Reams

■ Mr. Reams, engineer, Ford Motor Co., has compiled this practical book from actual shop experience plus proved engineering information. His discussions of modern methods of blast cleaning and ventilating methods are applicable to all types of metal cleaning by the blast method.

Full information is given on selection of abrasives, abrasive cleaning methods, selection of equipment, abrasive reclamation, advantages and limitations, ventilation and reduction of industrial hazards, and scores of other helpful facts.

Illustrations and diagrams in this 213 page book increase its value to the plant engineer. "Modern Blast Cleaning and Ventilation", $4* postpaid.

*Orders for delivery in Ohio must be accompanied by an additional 3% to cover compulsory state sales tax.

THE FOUNDRY—
THE PENTON PUBLISHING CO.
Book Department, Penton Building
CLEVELAND 13, OHIO

(*Continued from page 202*)

evaded all these earnest attempts to separate him from the payroll and any other hand and toe holds he happened to have in the community.

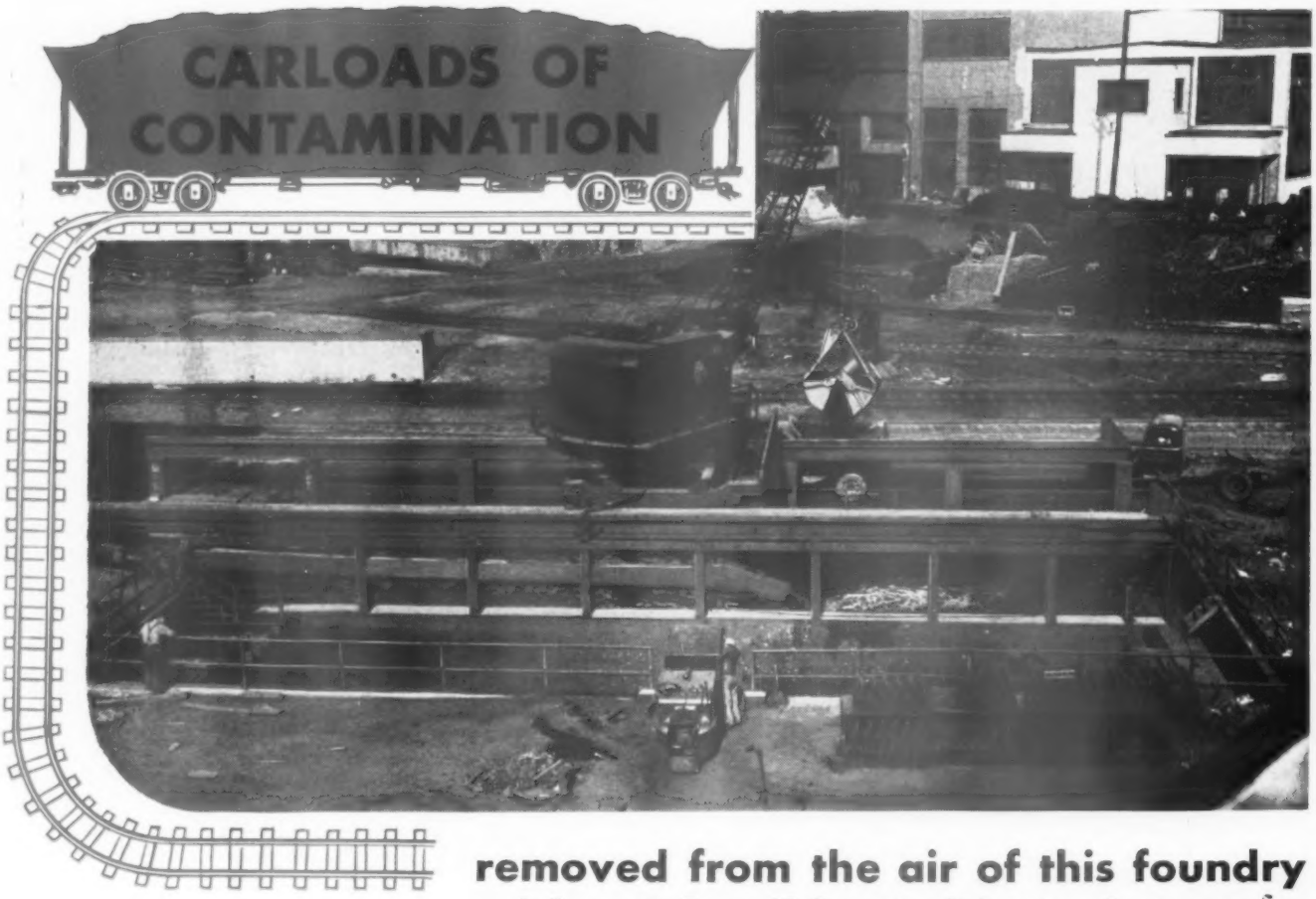
"And then what happens? I'll tell you what happens. Instead of snatching the gun from the holster, swift as a striking snake and pouring a stream of lead into various parts of the opponent's anatomy, thus finishing off the job in a neat, thorough and workmanlike manner, the two berserk terriers ignore the guns completely and jump at each other all hands and feet, for all the world like a pair of peevish billy goats in the back pasture, or any other place they may happen to meet.

"At the beginning of the saloon duel, the place is thickly populated with more or less fair women and brave men. The floor is crowded with chairs and tables. The gleaming bar and the shelves behind the bar are filled with bottles of assorted shapes and sizes, and these in turn, presumably, are filled with elixirs, cordials and revivifiers extensively used as first aid items, thirst quenchers, snake bite neutralizers, eye openers, also as handy stuff to have around in case of Indian raids, strikes, fires and other major and minor emergencies which sneak up on a man as freely in the great open places as in the crowded city.

"Object of the fight apparently is not so much to knock the living—that is I mean to say—not so much to inflict severe bodily damage on each other as it is to smashing all the furniture into small pieces, also to break all the bottles and spill their precious contents on the floor. While the battle still is under way, the fair ladies disappear. The brave men carry away door and window sashes in their natural anxiety to view the exhibition from a more favorable location on the outside. The two main characters exchange under and upper cuts, dive under, over and through the furniture. When nothing more is left to smash, the hero raises the bedraggled villain to an upright position. Holds him there carefully for an instant with the left hand and then, summoning the last reserve of strength, draws back the old trusty right hand and smites the party of the second part with hearty force and vigor on the jaw. Party collapses to the floor to the vociferous applause, whistles, screeches, hand clapping and foot stamping of all the dear little boys and girls in the movie house . 'Wow,' they breathe in chorus, 'The end of a perfect day.'"

"I doubt very much," Bill admitted, "that I could knock out a mess of tripe like that. I guess I had better stick to my own racket, the foundry. I had an inquiry recently from a lad who wrote that he would appreciate any informa-

(*Continued on page 206*)



removed from the air of this foundry with a Schneible-Multi-Wash System

Pictured is the Twin Type Concrete Recirculating and Dewatering Tank serving the complete Schneible Dust Collecting System in a large automotive foundry.

While the tank was installed principally for the dust collector system it also serves as a means of disposal for waste sand and core materials, etc., of the character that can be sluiced into a water stream. The collected sludge is loaded into railroad cars or trucks by means of a crane with clamshell bucket.

Without the efficient and comprehensive dust control and ventilation provided by the Schneible system, a substantial part of this huge volume of dust would be breathed by the workers, with most adverse effect on worker efficiency and production costs, besides the destructive effects on motors and equipment.

Schneible has provided an imposing list of foundries with complete service-proved equipment for the control of all dust and fume-creating operations; properly designed hoods for the continuous removal of dust; correctly engineered ductwork for both contaminated and replacement air. Schneible Multi-Wash Collectors thoroughly clean the air, and the collected matter, as sludge, gravitates to Schneible Dewatering Tanks (available in a number of types) where solids are separated and water reclaimed for repeated use in the collectors.

A Schneible wet-method system solves the foundry dust problem for all time; is trouble-free and low in ultimate cost. Send for Bulletin 47, "Schneible in the Foundry Industry."

Six Schneible "GM" Type Cupola Collectors, at the same automotive foundry as the Dewatering Tank shown above, have ended nuisance caused by cupola dust.

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Buehler specimen preparation equipment is designed especially for the metallurgist, and is built with a high degree of precision and accuracy for the fast production of the finest quality of metallurgical specimens.

1. No. 1315 Press for the rapid moulding of specimen mounts, either bakelite or transparent plastic. Heating element can be raised and cooling blocks swung into position without releasing pressure on the mold.

2. No. 1210 Wet power grinder with ¾" hp. ball bearing motor totally enclosed. Has two 12" wheels mounted on metal plates for coarse and medium grinding.

3. No. 1000 Cut-off machine is a heavy duty cutter for stock up to 3½". Powered with a 3 hp. totally enclosed motor with cut-off wheel, 12" x 3/32" x 1-1/4".

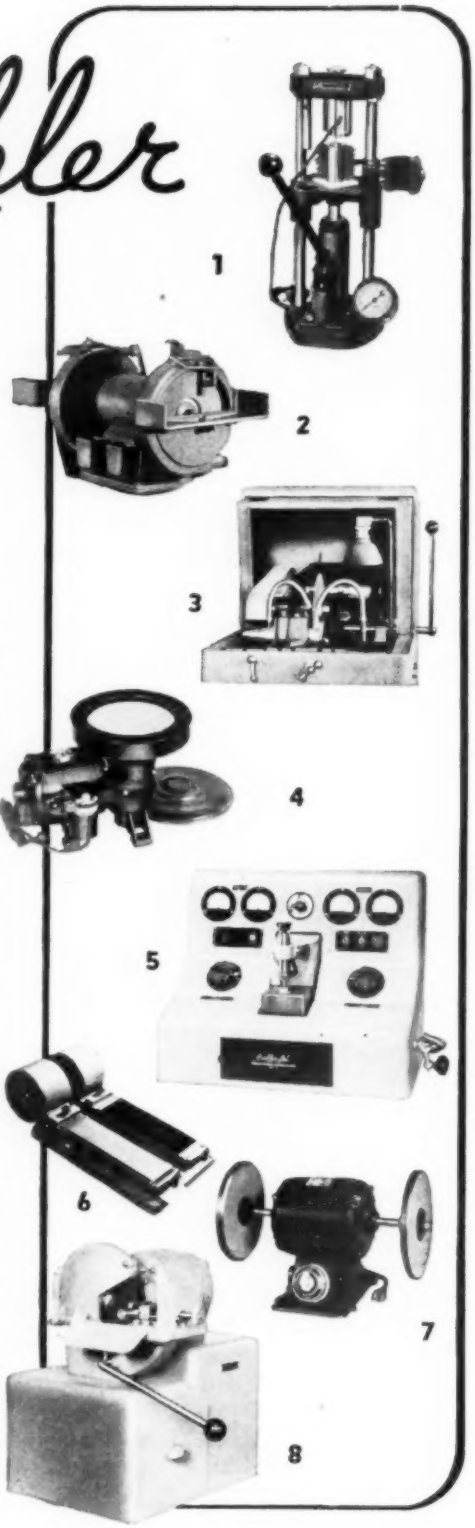
4. 1505-2AB Low Speed Polisher complete with 8" balanced bronze polishing disc. Mounted to ¼ hp. ball bearing two speed motor, with right angle gear reduction for 161 and 246 R.P.M. spindle speeds.

5. No. 1700 New Buehler-Waisman Electro Polisher produces scratch-free specimens in a fraction of the time usually required for polishing. Speed with dependable results is obtained with both ferrous and non-ferrous samples. Simple to operate—does not require an expert technician to produce good specimens.

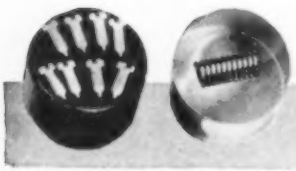
6. No 1410 Hand Grinder conveniently arranged for two stage grinding with medium and fine emery paper on twin grinding surfaces. A reserve supply of 150 ft. of abrasive paper is contained in rolls and can be quickly drawn into position for use.

7. No. 1400 Emery paper disc grinder. Four grades of abrasive paper are provided for grinding on the four sides of discs, 8" in diameter. Motor 1/3 hp. with two speeds, 575 and 1150 R.P.M.

8. No. 1015 Cut-off machine for table mounting with separate unit recirculating cooling system No. 1016. Motor 1 hp. with capacity for cutting 1" stock.



The Buehler Line of Specimen Preparation Equipment includes . . . Cut-off Machines • Specimen Mount Presses • Power Grinders • Emery Paper Grinders • Hand Grinders • Belt Surfacers • Mechanical and Electro Polishers • Polishing Cloths • Polishing Abrasives.



Buehler Ltd.

A PARTNERSHIP

METALLURGICAL APPARATUS

165 WEST WACKER DRIVE, CHICAGO 1, ILLINOIS

(*Continued from page 204*)

tion on specifications for ingot, or perhaps more properly speaking, pig molds in which over iron is poured in gray iron foundries. He was interested in a type of mold or group of molds to hold from 500 to 1000 lb.

"I replied that as far as I know, at least up to the present, no person or group of persons, has busied himself or itself in drawing up a set of specifications for these castings. Usually they are considered a very minor appendage indeed in the list of foundry equipment. In many foundries, particularly of the general jobbing type, iron molds in which to spill the over iron from the cupola, and the dribbles left in the bottom of the ladles, are conspicuous by their absence. The experienced foundry foreman estimates his heat so that he does not have more iron charged than necessary. Where

Should wear mask and nose guard

he has iron left over in the cupola, he does not melt it. He drops the bottom.

"To take care of heels left in the bottoms of ladles, a few rough pig molds are formed in the sand at any convenient point on the floor, usually in the vicinity of the cupola. The main objection to this rough and ready technique is that the resulting pigs are large and unwieldy and must be broken later with a sledge hammer. Some dyed in the wool old timers admit that iron molds are neat and tidy but they neglect to install them for two main reasons: 1—They have a deep rooted and conscientious objection to spending any money for patterns and castings. Fill-falls and furbelows. Their fathers never had them or needed them. What was good enough for their fathers and grandfathers is good enough for them. 2—Super-cautious foundrymen point to the fact that while an iron pig mold is a convenient and handy device, the same mold may be a deadly weapon if a care-

(*Continued on page 208*)

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Guarantee Efficiency

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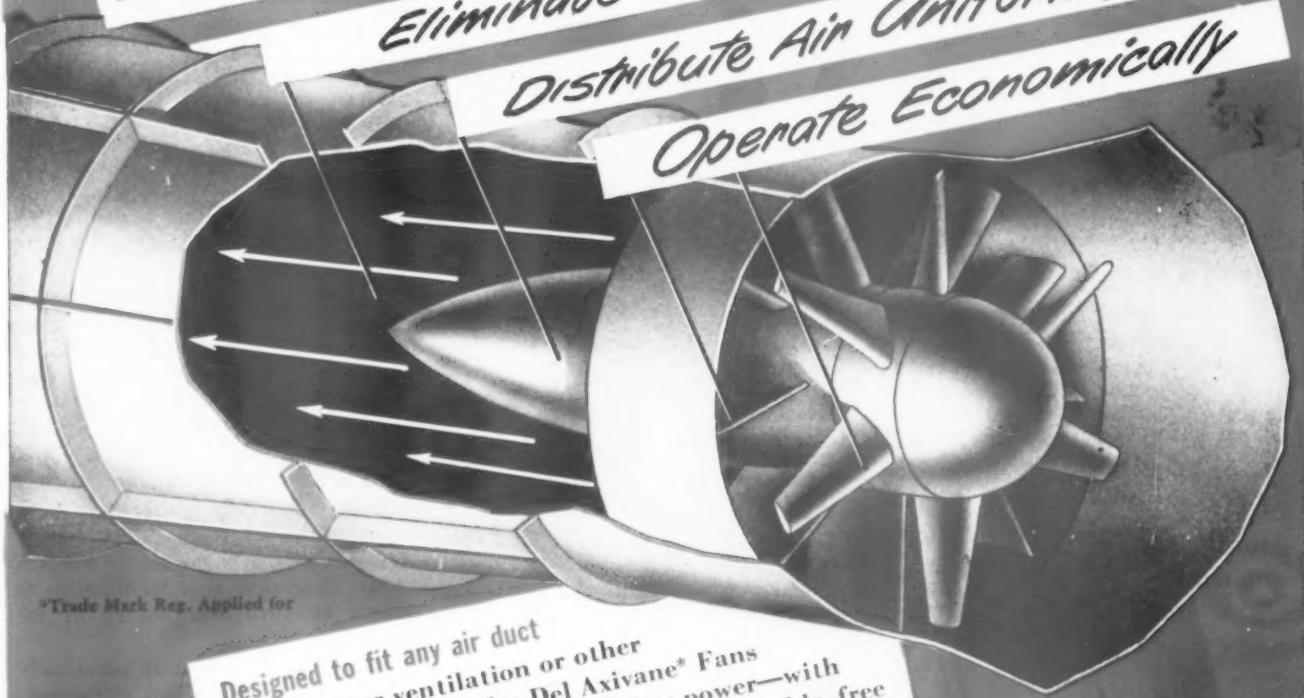
Eliminate Turbulence

Distribute Air Uniformly

Operate Economically



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Style CW60

ROOM WANTED FOR SPECTACLES? . . . There's comfort for wearers of prescription glasses in Willson Cover-Alls.* And the adjustable leather bridge rests lightly on the nose without pressure. Willson-Weld* lenses in the shade you specify, of course.

Style RW50

GAS WELDERS GO FOR IT . . . Assured protection of Willson-Weld lenses and comfortable face fit make this goggle day-in, day-out favorite for flame cutting and cleaning as well as welding. Indirect ventilating ports exclude glare.

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FOR EYES THAT LEAD A DOUBLE LIFE . . . From welding to chipping with a flip of the wrist! Willson-Weld lenses in separate frames flip up to leave eyes protected by clear, Super-Tough* lenses.

For complete information on these products and their application, as well as many more eye and respiratory protective devices, get in touch with your nearest Willson distributor or write us direct.

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GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE **WILLSON**

PRODUCTS INCORPORATED

Established 1870

237 WASHINGTON ST. • READING, PA.

(*Continued from page* 206)

less employee leaves a small quantity of water in the bottom.

"With these general observations out of the way, and assuming that you intend to make and use cast iron molds, the following items are submitted for your information. The composition of the metal may vary over a wide range and still serve satisfactorily. The castings are not exposed to severe tensile or transverse strains, to bending stress or distortions. They are not exposed to erosion, corrosion from gases or liquids. Only one quality is essential. That is the ability to expand and contract without cracking. Experience over a period of many years indicates that a bessemer pig iron extensively employed in the production of steel mill ingot molds is the most satisfactory. Analysis of this iron shows: Combined carbon 3.75 per cent, silicon 2.00 per cent, manganese 0.80 per cent, sulphur under 0.06 per cent, phosphorus under 0.20 per cent. Design of the mold is as important as the composition. Sharp interior corners are to be avoided. The bottom of the pig molds should be curved at the sides and ends, and the walls should be tapered generously to facilitate removing the pig castings.

"Too many designers of pig molds follow the pattern laid down by the makers of billet molds for light rolling mills. These molds have sharp corners and the taper on the sides is held to a minimum, precautions observed to facilitate passage through the rolls with minimum change in general shape. The pig casting is not under any such restriction. Its only function is to hold a given quantity of metal, and to allow that metal to be removed with a minimum of effort after it has solidified. Sharp corners, as every foundryman knows, accentuate any tendency toward cracking in a casting subjected to alternate heating and cooling stresses. In actual operation the life of the molds may be prolonged practically indefinitely by removing the hot pigs as soon as possible after solidification to prevent excessive over heating of the mold.

"The molds may be set up individually or as a battery. Since part of the general scheme is to convert miscellaneous amounts of molten iron into convenient size pigs, the mold cavity should not exceed 5 in. width at the top, 4 in. at the bottom and 12 in. in length, to hold approximately 50 lb. Allowing for the taper, outside of the mold is approximately rectangular with a wall thickness of 1½ in.

"Following description covers a double battery of pig molds in service for many years in a prominent eastern foundry. The molds are mounted in two rows, one row above and one row below a steel

(*Concluded on page* 210)

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PENTON'S FOUNDRY LIST

for 1947-1948

A valuable sales aid in your direct mail and personal contact work with the foundries of the United States and Canada. Gives information on the Gray Iron, Steel, Malleable, Brass, Bronze, Aluminum and Magnesium foundries.

Alphabetically and geographically indexed in sturdy loose leaf form with a durable ring binder and ample space for your own additional notes on each page. All information "keyed" to show at a glance the type of metal melted, whether a machine shop, pattern shop, laboratory etc. is maintained.

The name and address of each foundry is given together with the type and number of melting units, melting capacity and departmental operations.

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LEAVENWORTH, KANSAS

COMBS GYRATORY FOUNDRY RIDDLES

(*Concluded from page 208*)

I-beam. After the upper row of molds is filled, the assembly is inverted by a wrench attached to the end of the trunnion or center shaft and the second row of molds is brought into service. The assembly includes a pedestal at each end connected to each other by a suitable length of steel I-beam. A trunnion bolted or welded to each end of the I-beam rests in a bearing on top of the pedestal. Each mold is provided with a short horizontal slot at each end. These slots embrace the flange of the I-beam and thus are held firmly in position, irrespective of whether they are on the top or the bottom. A short piece of angle iron bolted to the beam at the end prevents any end movement of the molds. When a mold is broken or becomes worn in service, the angle iron may be removed temporarily, while the defective mold is removed and replaced by a new one."

Book Review

Proceedings 1945-46 of the Institute of British Foundrymen, cloth, 325 pages, 7¼ x 9¾ in., published by the Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3, England.

This annual publication (Vol. XXXIX) of the Institute of British Foundrymen pertains to its activities during the 1945-46 season and more particularly to the annual conference held in Birmingham of which a summary is presented as well as the annual report. In addition it contains the presidential address by D. Howard Wood, and the Edward Williams Lecture by Sir Claude D. Gibb.

Following these sections are 13 papers and discussions presented at the annual conference and which cover a wide range of topics. The volume also contains 14 papers and discussions presented at various branches of the institute during the year.

IFMA Offers Prizes For Best Articles

Industrial Furnace Manufacturers Association is sponsoring a contest to promote the publication in trade publications of articles describing the economic advantages obtained by the use of modern industrial furnaces, kilns and ovens. Papers published between Oct. 1, 1947, and Sept. 1, 1948, will be eligible for the prizes of $1000, $300 and $200.

Articles may be original or they may be technical society papers subsequently published in trade or technical papers. Competition is open to all individuals or groups with the exception of those connected with the industrial furnace, kiln or oven industry. Formal rules and other details can be obtained from the IFMA, 420 Lexington Ave., New York.

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TEN TONS of quality cores in 8 hours — cores from 1 oz. to 300 lbs. in size — is the daily output of these two small, *fast-baking* DESPATCH Ovens.

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WRITE TODAY for Bulletin J-31

MAKES LARGE STEEL CASTINGS FOR PEACETIME USES

(*Continued from page* 92)

city from 10 to 125 tons. Molds are made in seven large pits at various points in the floor of this bay. One pit is 25 x 120 ft, 16 ft deep; one pit 25 x 80 ft, 16 ft deep; one pit 25 x 80 ft, 14 ft deep; one pit 25 x 120 ft, 14 ft deep; and three pits 10 ft deep, 30 ft long and 14, 16 and 18 ft wide, respectively. Through slots in the side walls, heavy steel bulkheads may be lowered and anchored into place to divide a pit into sections.

In the fourth bay molds large and small are made in flasks and dried in a battery of 16 large ovens. These ovens, three of which are 10 x 20 ft, four 18 x 40 ft, and nine 10 x 40 ft, are located in the 40-ft wide third bay. Each oven car is loaded in the fourth bay, pulled into the oven, and some time later is pulled out of the opposite end of the oven. The dried molds are lifted off and placed on the floor in the general vicinity of the melting furnaces. Various mechanical movements in connection with the operation of each oven are controlled through a push button panel. Doors are hoisted and lowered, car is pulled in either direction and burners, temperature and air circulation apparatus on the oven roof are regulated through this panel.

Doors stop mechanically in either open or closed position. Car stops at a definite point before entering the oven, in the oven and on the track in the delivery bay. The car cannot be moved when one or both doors are closed. A long, conveyor type chain attached to each end of the car and actuated by suitable gearing under the floor at each end moves the car in either direction as required. Thermostatic control regulates the temperature and the volume of air required for recirculation and for removal of steam and moisture. The burners, fitted for gas or oil on the roof deliver heated air through rows of ducts in the oven walls at several stages above floor level and at temperatures that may be regulated between 500 and 700° F. In design, construction and operation, this battery of modern ovens is in perfect keeping with other appointments in this large and modernly equipped steel foundry. In addition to these ovens, three car type, oil-fired ovens are employed for drying cores in the coremaking department at the south end of the fourth bay.

Use Patterns or Cores

Returning to No. 2 bay, molds for the largest casting are made in pits equipped with anchor bolts for securing the binder bars which extend over and across the tops of the assembled molds. In some instances a full pattern is employed and the molds are made in the usual manner, but in the majority of instances a number of dry sand cores are assembled to form a complete mold. Most of the work is done in the drawing office, the pattern shop and the coremaking department. Every large casting presents an individual problem, because these huge objects are not ordered in quantity lots. Elaborate pattern and other equipment, quite proper where mass production is involved, are not included as major factors in the plan where only one casting is required.

Two main factors receive the most serious consideration. The first is development of a method that, so far as possible, will anticipate all hazards and will result in the production of a satisfactory casting. The second factor is based on the necessity of doing the foundry work at minimum cost and in minimum time.

After the metal has solidified in the large castings made in pit molds, the weights, binder bars, rails and supplementary rigging are removed. Wherever

(*Concluded on page* 214)

NEW BELT SANDER FOR DRILL PRESS
Does Finishing Jobs Faster, Better

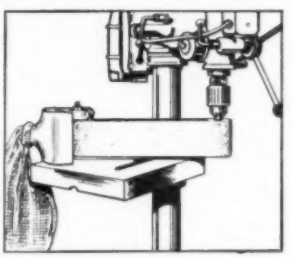
A new, simple, faster method for many surface finishing jobs on wood, metal, plastic and other materials has been announced by the OK Specialty Company of Chicago. The new finishing method takes the form of the OK Belt Sander, a drill press attachment.

The new sanding device weighs less than 5 pounds. It is made up of an aluminum base with backing plate or platen, a driven pulley mounted on ground steel shaft and running on precision ground ball bearings, and cast aluminum driver pulley mounted on ½" ground steel shaft to fit into the drill press chuck.

The base of the sander is bolted to a drill press table. Merely by moving the drill press table, the attachment can be adjusted to handle sanding belts from 26" to 36" in length.

The sander takes belts from ½" to 3" in width. Two sanding belts, one coarse grit and one fine grit, are furnished with each attachment. The device comes assembled ready for use with any drill press. Most efficient performance is achieved at 3500 to 5000 RPM. The sander stands 5" high, and the base measures 10½" long by 3¼" wide.

Another time-saver on the job is chewing gum. Chewing gum may be used even when hands are busy; and under dust conditions helps to keep the throat moist—prevents "false thirst." For these reasons many plant owners make Wrigley's Spearmint Gum available to everyone.



OK Belt Sander
Assembled, Ready for Action

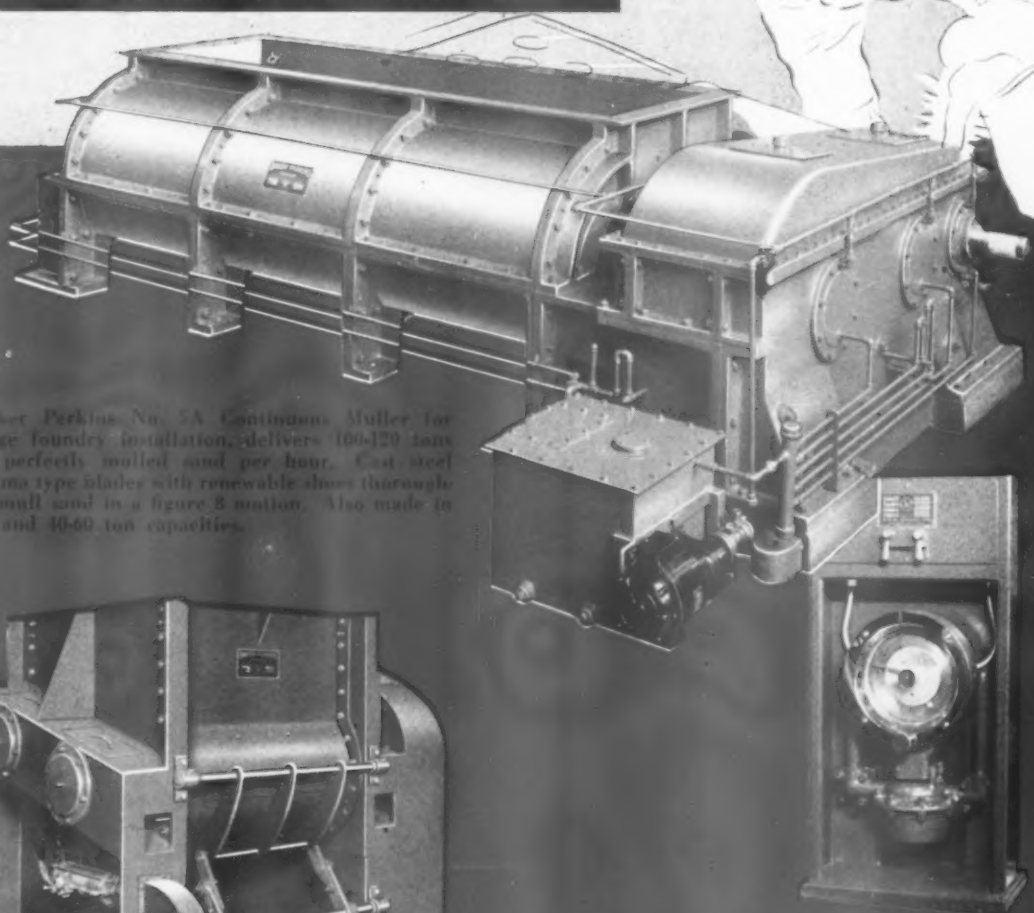
You can get complete information from
OK Specialty Company, 4655 N. Clark St., Chicago, Ill.

AB-69

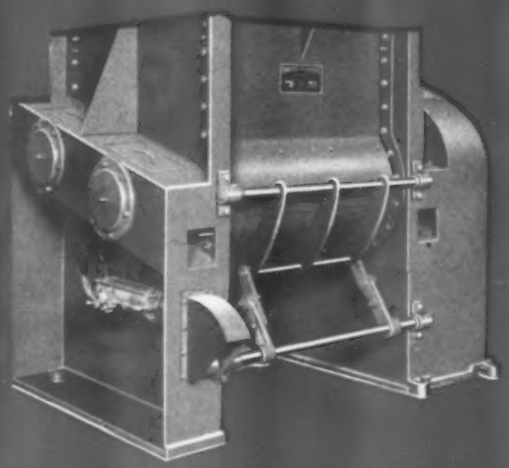
BAKER PERKINS FOUNDRY EQUIPMENT

Are you concerned over rising costs of production and maintenance in your foundry? Are you losing money by producing an abnormal number of faulty castings owing to improper processing of sand? The efficient performance of Baker Perkins Foundry Equipment may solve your problems. Let our engineers review your production system and recommend the specific Baker Perkins equipment that will increase production of higher quality castings at less cost.

BAKER PERKINS INC., FOUNDRY EQUIPMENT SALES, SAGINAW, MICHIGAN.



Baker Perkins No. 5A Continuous Muller for large foundry installation, delivers 100-120 tons of perfectly mulled sand per hour. Cast steel Sigma type blades with renewable shoes thoroughly mull sand in a figure 8 motion. Also made in 30 and 40-60 ton capacities.



Baker Perkins "Unidor" Core Sand Mixer. Rubs, stirs, and kneads—all in one operation. Distributes a thin layer of bond around each sand grain, assuring 100% benefit from bonds, oils, binders, and other compounds. 5½ to 20 cu. ft. working capacities.

Baker Perkins Liquid Meter for accurately and automatically measuring water or binding oil flowing into each B&P core sand mixer. Simple!—just register the amount of liquid desired on the dial, and the control mechanism does the rest. Capacities up to 600 lbs.

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(*Concluded from page 212*)

necessary, the casting is stripped to facilitate contraction. Nuts are slacked off. Wedges are released and bars or pieces of plate are removed at strategic points. No further action is taken for one, two or several days, depending on the bulk of the casting and the thickness of metal section in various parts. In extreme cases the time is extended. For example, the 236-ton casting referred to previously, remained in the sand for 7 weeks.

In the ordinary routine, when a casting has cooled to a temperature of 400°F it is lifted from the pit and the surrounding cores are stripped from the surface. It is then loaded on a car and hauled into an annealing furnace where it is raised to a temperature of 1650°F, held at that temperature for a definite period and then allowed to cool. The holding time varies, but in a general way is based on the formula of one hour per inch of cross-sectional area. Before the annealing or heat treatment the gates and sink heads are cut off with a torch. After annealing the castings are chipped, ground, weighed and shipped either to the adjoining machine shop, or direct to the customers. On exceptionally heavy sink heads, a row of holes is drilled horizontally through the neck. The torch then is applied to remove the comparatively thin metal membranes between the holes.

Many molds for small and medium castings are made in flasks on a pair of jolt machines with tables 72 x 96 in., and supplied with sand from overhead hoppers. These molds with others large and small are made individually in flasks all over the greater part of the floor in No. 4 bay. They are loaded on cars, passed through the drying ovens, lifted off the cars in No. 2 bay, where they are cored, assembled and made ready for reception of the metal. Later, the molds are taken to the shakeout station, a 12 x 12-ft grating at floor level equipped with a powerful vibrator at each corner. The vibrator units may be operated singly or in groups depending on the size of the flask or flasks undergoing treatment. The sand falls through the grating onto a belt arrangement which carries it to the far side of the molding bay, where it is reconditioned for use in a double muller installation. Sand for the coreroom at the south end of this bay is prepared in the same unit.

Facing Sand Properties

Typical facing sand mixture shows moisture content 4.5 to 6 per cent; green permeability 140 to 160, minimum dry 170; green strength compression 5 to 8 psi; dry tensile strength minimum at room temperature 100 lb.

No. 5 bay, 40 ft wide, serves as a storeroom for miscellaneous foundry tools and supplies, sand binders, chaplets, nozzles, stoppers, etc. Incidentally, in the melting and pouring section, each ladle is equipped with two nozzles and stoppers. Sprues and pouring cups on many molds are adjusted to take advantage of this arrangement. The fifth bay also houses the foundry office and the elaborate shower and locker rooms for the employees.

Greater part of the sixth and last bay, in the early days devoted to the manufacture of shells for the armed forces, has been converted to a welding and forge shop. A second floor, approximately 80 x 120 ft at the north end of this bay, serves as a pattern shop. Most of the work here is devoted to repairs, and alterations of existing patterns. Practically all new patterns are constructed by outside interests. The floor at two points extends about 15 ft into the adjoining bay to form landing stages for patterns entering and leaving the pattern shop. A crane places the incoming patterns and removes the outgoing patterns from these platforms.

Jackson Bros. Foundry & Mfg. Co., 5448 Tweedy Blvd., South Gate, Calif., has obtained approval for construction of a foundry building to cost about $4000.

Ajax ALUMINUM BRONZE ALLOYS

for WEAR-RESISTANCE

STABILITY AT HIGH TEMPERATURES

ABILITY TO WITHSTAND SUDDEN STRAINS

Investigation of Aluminum Bronze Alloys is warranted by foundrymen and designers where metal parts are subjected to either recurrent stresses or compressive forces and resistance to fatigue is sought; where the ability to withstand high temperatures or, where a high degree of corrosion resistance to many chemicals may be a significant factor in material selection. Supplied by Ajax in alloyed compositions of copper, aluminum and iron, as well as special alloys containing nickel and manganese, a complete selection of Aluminum Bronzes is available to meet all existing specifications as listed by Non-Ferrous Ingot Metals Institute, ASTM and the Federal Government.

Ajax, in adhering to its policy pioneered in the very infancy of the non-ferrous metal industry, exercises the closest scientific control over the production of these alloys. Metal men may look to Ajax with continued confidence not only for supply of highest quality Aluminum Alloy ingots, but also for practical technical know-how on correct foundry practice for producing better castings with fewer rejects. Request booklet "Ingot Metals of Today".

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SELECTING PROPER PATTERN EQUIPMENT

(*Continued from page* 93)

need for a pattern engineer. This man should have a diversified background; basically, of course, he should be a qualified patternmaker with some experience in engineering design. He should be familiar with production machine shop practice. Last but not least, he should have worked in and around the foundry long enough to be acquainted with some of its problems.

Depending upon type of operation gating of patterns should be the responsibility of two groups—foundry supervision or metallurgical department or combination of the two. Gating is proved by a trial run indicating that runners, ingates, and risers are satisfactory to produce, castings with little or no scrap due to gating defects. The gating should be fastened securely to pattern equipment and consist of material that is as resistant to wear as the pattern itself.

Selects Typical Casting

The elbow casting shown in Fig. 1 has been selected to demonstrate the most practical pattern equipment for various production quantities. It weighs 2½ lb and extends approximately 4 in. in each leg. Assume that it represents a new design and the trial run is 25 pieces. To make accurate castings with little fear of pattern breakage, a split hardwood pattern is indicated with two half hardwood coreboxes. For our discussion we shall use some relative figures on costs which are not based on any specific pattern but only are meant to compare values of different types of equipment. This split hardwood equipment might cost $80. A fair estimate of casting price from this equipment could be 48 or 50 cents each. The initial pattern cost added to this first lot of castings brings the price per piece up in the stratosphere—over $3.50 each. However, this cannot be avoided in new design.

After the experimental run the purchasing agent either examines the pattern or is told that it is still in excellent condition. His first production run to supply dealers and demonstrators could be 1000 pieces. "We have a good pattern, let us use it until it is worn out" is his first thought. With a little refinishing from time to time this pattern could last for the 1000 pieces or more. On a run like that he feels that the foundry should cut the price. Perhaps he is given the casting for 45 cents each and he feels that he is getting his money's worth out of his pattern.

On the other hand, the foundry might refuse to run that pattern and insist on four aluminum patterns on a matchplate (Fig. 3) with a split aluminum booking box and 25 aluminum core driers. This equipment might cost $350, an outlay that might scare him even though he is promised a cheaper castings price of 27 cents each. But knowing that this new pattern will last for many thousands of castings he purchases it. Often the deciding factor is that he can get his order out in two weeks instead of two months. After making some 2500 castings this new pattern has returned its complete value in direct savings on castings.

Assume that the gadget on which the castings is used clicks and he wants to put through a lot of 50,000 pieces for delivery within three months. He could buy several additional sets of similar equipment, supplying each with 50 core driers, and spread them among different foundries. This would not tend to reduce his casting price a great deal and it might complicate his machining problems in slight variations between patterns and sources.

This additional equipment could cost $1500, which would have to be charged against speed because it does not reduce the castings prices an appreciable amount. That same money would be better spent in one additional match-

AJAX
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ELECTRIC FURNACES
for the ALUMINUM ALLOY
FOUNDRY . . .
AJAX
THE AJAX-Tama-Wyatt Low Frequency Induction Furnaces are now made in small sizes with capacities ranging from 20 to 35 kw.
Their operation is based on the induction principle whereby energy is transmitted to the molten charge without actual contact, through the refractory walls. Only the metal is heated, and therefore, there are no resistors or other parts having a higher temperature than is absolutely necessary for properly melting the charge. A gentle movement of the bath insures uniform temperature and homogeneous mixing of the alloy ingredients. Linings are made of inert refractories which do not contaminate the melt.
These melting machines are delivered with a self-contained completely factory wired control cubicle, including automatic temperature controller.
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AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

plate or machined cast iron patterns mounted on cope and drag plates depending on existing foundry technique.

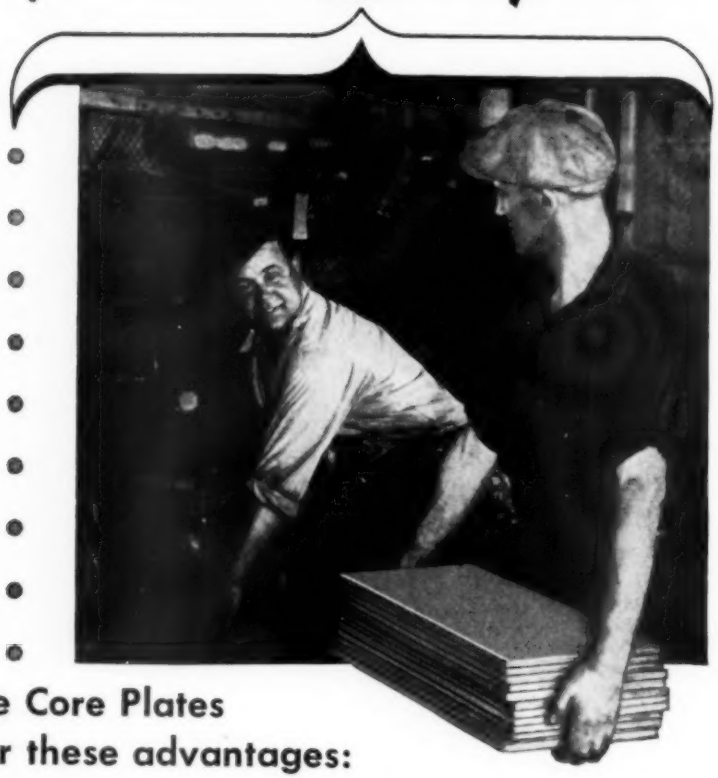
With this we would make one cast iron or steel-faced aluminum corebox rigged for a cylinder coreblower, the type which draws the top half of the box from the core as it is blown. With this box we would supply 250 or 300 core driers that would produce 600 cores or 2400 castings (1 core makes 4 castings) in one shift in the coreroom by turning the driers over twice. With this equipment and some degree of mechanization in the molding operation the casting price might be reduced to 18 cents each. At this rate the initial lot of 50,000 pieces at 11 cents saving per casting would return $5500. This returns the pattern price three fold and enables the production of the 50,000 castings in less than two months time in the foundry.

Again we would like to state that our values are only for comparison and have no basis in fact.

While this example may have little significance for certain foundries, usually there are some jobs in most shops that could be better engineered with marked savings. The best way to counteract competition from other materials and to develop new markets for foundry products is by making better castings cheaper. To accomplish this we must find time to think. We must tool our shops with the most economical and best engineered patterns that our production requirements justify.

Editor's Note: This paper was presented at the Seventh New England Foundry Conference, held in Cambridge, Mass., Mar. 28-29.

"Sa-ay...these are Lighter"



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Core makers save trips . . . handle many plates at one time.

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Made of fibrous asbestos and cement, Transite Core Plates resist shock . . . are less likely to crack or break.

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TRANSITE CORE PLATES
MADE OF ASBESTOS

THE NONFERROUS FOUNDRY INDUSTRY

(*Continued from page* 97)

the amount of profits, including officers' compensation, earned in the period. These were not accurate assumptions in all cases, but experience proved that the error involved was not serious enough to warrant gathering formal profit and loss statements from reporting foundries. Even for a year's period, the error was small on an overall basis, since most foundries included year-end adjustments in their reports for the month of December, although no instructions to this effect were ever issued by OPA.

Employ 3-month Period

Because figures on a single month's operations are subject to many chance influences, costs and profits were not analyzed for less than a three-months' period. To keep informed of the industry's current position, OPA regularly maintained records analyzing costs and profits in the most recent three months for which reports had been received. Thus, for instance, when reports for the month of May came in, industry averages for the three-months' period, March through May, were computed to take the place of the February-April averages which had up to then been taken as representing the industry's current position.

The extreme fluctuations in sales volume which occurred over the period 1940-46 made it impossible to follow cost and profit developments by looking at dollar cost and profit figures alone. Two types of ratios were used. The first expressed costs and profits on a per pound basis. The second measured them in ratio to dollar sales. Such ratios were computed for each foundry in a sample. A straight average of these ratios was then computed for the sample. This procedure gave every foundry included in a sample an equal influence upon the averages derived. These are unweighted averages, as contrasted to weighted averages in which companies with a large volume of sales have a greater weight than companies with a small volume of sales. A check has shown that results

(*Continued on page* 218)

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UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH, MICHIGAN

(*Continued from page 216*)

would not be far different in the brass foundry field, if weighted averages were used instead of unweighted ones. In the aluminum or magnesium field, however, there would be at times a marked difference.

Average cost and profit ratios for the several classes of foundries are quite dissimilar. This is shown in Table XX, although the fact that this table is based upon data for 1944, when light metal foundries were in an extraordinary type of work, means that the variations appear exaggerated. Many factors contribute to these variations, the more important of which should be noted, since among them are factors which also explain variations in cost and profit ratios among companies of the same type and variations in the ratios of a given company or group of companies over a period of time. Since ratios to dollar sales are determined by the relationship of per pound costs and profits to per pound price, only the differences shown in per pound figures will be considered.

Variations in metal costs per pound are mostly simply explained. They indicate variations in the prices paid for the metals used and variations in metal loss experience. Metal cost per pound for magnesium foundries is high both because magnesium is an expensive metal and because unusually large metal losses are involved in working with it. Metal cost per pound for specialized brass foundries is relatively low because one class of these specialized companies, foundries which make railway journal bearings, uses large quantities of scrap metal, unlike other brass foundries. (The combination of the cost ratios of companies specializing in ship propellers and companies specializing in railway journal bearings is not desirable, since the ratios characteristic of the two types of foundries are not similar. Information is available for so few companies of each class, however, that publication of separate averages is not permissible).

Origin Is Complex

Variations in other per pound figures have a more complex origin. They reflect first of all the relative weight of copper, aluminum and magnesium. The tonnage of brass foundries is roughly three times what it would be if these companies were working with aluminum rather than copper-base metals. One reason their per pound labor costs are lower than those of aluminum foundries is, therefore, the mere fact that their payroll is spread over more pounds. This same fact is a partial explanation of the lower per pound figures shown by brass foundries for other costs and for profits plus officers' compensation. Similarly, the tonnage of aluminum foundries is somewhat more than it would be if magnesium were substituted for aluminum and this fact complicates the comparison of per pound costs of aluminum and magnesium foundries.

Unit labor costs are also affected by such factors as wage rate levels, amount and type of labor required for the particular castings produced, and size of castings. Reporting magnesium foundries had average labor costs of 72c per pound in 1944. Wage rates paid by magnesium foundries are somewhat higher than those paid by other nonferrous foundries, due to the physical hazards involved in working with magnesium. Secondly, magnesium castings produced in the war years were complex in design and required unusual labor time. At the other extreme, specialized brass foundries show average labor costs of 3c per pound. For companies producing railway journal bearings, this figure was even lower. There is no corework in railway journal bearings and little in ship propellers. Furthermore, both types of castings are heavy, and labor cost on heavy castings, placed on a per pound basis, is inevitably low.

Variations in other costs, over and be-

(*Continued on page 220*)

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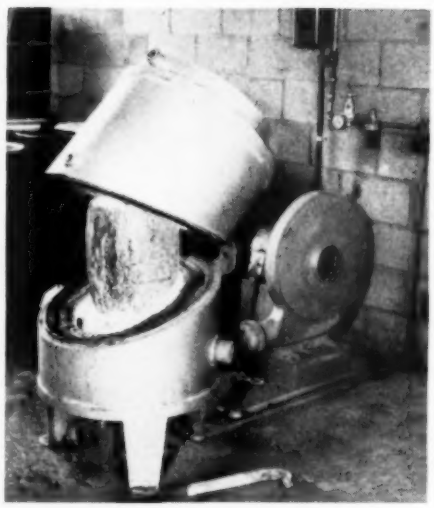

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(*Continued from page 218*)

yond those explained by weight differences alone, are due to a multitude of factors related both to the type of company found in each class of foundry and the types of castings produced. Differences in the ratios of brass single-line and multiple-line sellers also arise from the policies followed by the latter class of company in allocating costs to nonferrous castings sales. It was not practicable for OPA to give instructions on this point. The higher costs which multiple-line sellers show, therefore, may stem in part from the methods used by individual companies in distributing overhead and other joint costs.

Obviously, net sales realization per pound must bear some relation to costs per pound. Information collected by OPA on nonferrous foundry pricing methods shows that many foundries do not estimate costs with any degree of accuracy before quoting a price. (See the articles by J. B. Meier on "Pricing Castings for Profit," THE FOUNDRY, February and March, 1947). Nevertheless, on an overall basis, some correlation appears between unit costs and unit prices.

Wide Range Exists

A wide range exists in the cost and profit ratios of individual companies and the average ratios of any class of foundry may be far removed from the experience of many companies within that class. This is illustrated in Figs. 8 and 9, which show percentage distributions by individual cost and profit ratios of the 94 single-line brass foundries whose average ratios are given in Table XX.

It will be seen that while the net sales realization of the full group of companies averaged about 34c per pound, it was less than 25c for 5 per cent of the group and 40c or more for 15 per cent. Metal cost was 15c per pound on the average, but for 15 per cent of the group it was less than 13c and for 10 per cent it was at least as much as 17c. Production labor costs were 8c per pound on the average. For a small proportion of the group, however, they were less than 4c; for 12 per cent they were 12c or more. (Fig. 9).

The average ratio of profits and officers' compensation to net dollar sales was about 12½ per cent, but for 5 per cent of the group there were no profits, even before officers' compensation, while for 17 per cent of the group profits, including officers' compensation, was 20 per cent of dollar sales or better (Fig. 8).

These wide variations in individual company ratios are explained by differences in product, and in methods and efficiency of operations. For instance a company with a low metal cost may be one working principally with the less ex-

(*Continued on page 222*)

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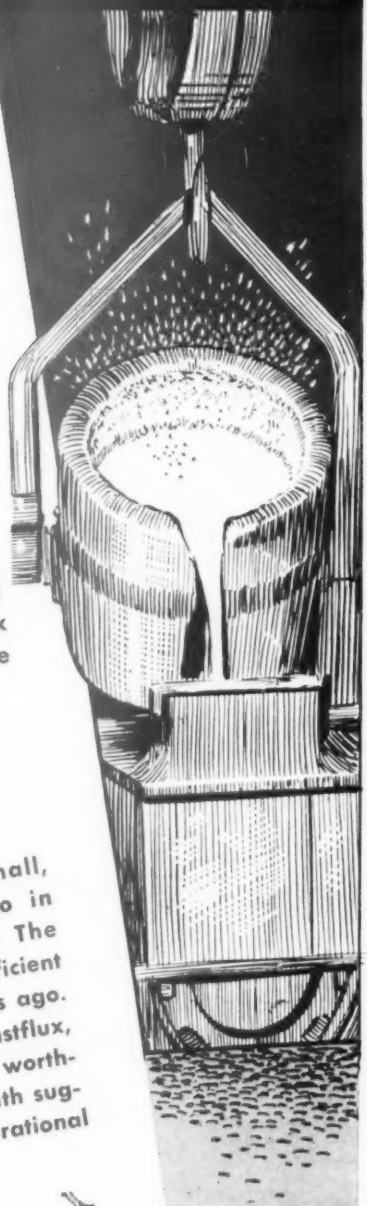

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(*Continued from page 220*)

pensive alloys. A company with a low unit labor cost may be one producing simple castings, or heavy castings, or using permanent molds for a portion of its output. Or again it may be one whose owners or officers work in the foundry, fillings jobs, as molders or coremakers, for which a competing foundry hires outside labor. The absence of uniform accounting procedures within the foundry industry is also a very important reason for variations in individual company ratios.

Size of company presumably also has its influence upon relative costs and profits. No conclusive evidence on this point will be found in the statistics presented here however. Theoretically, differences in the type of product of small and large companies would be expected, with large companies handling more difficult castings. Theoretically, there would also be differences in unit costs, with large companies enjoying the basic economies of volume production. These latter differences would show up chiefly in unit general, administrative and selling expenses, since differences in type of produce would so influence production labor costs and other manufacturing costs as to make it impossible to find the effect which size of company alone has upon these unit costs.

These expected differences appear to be present in the case of aluminum foundries. The average operating ratios of large and small aluminum foundries in 1944 are given in Table XXI. Large foundries are shown to have proportionately lower general, administrative and selling expenses ("all other expenses"). These foundries also produced a different, more difficult class of product than the smaller foundries, a known fact for which there is statistical evidence in the net sales realization of the two groups. It is not clear of course, that a peacetime comparison of small and large aluminum foundries would show the same results.

In the case of brass foundries, however, the operating ratios of small and large foundries in 1944 were surprisingly close, as is shown in Table XXII. Insofar as average price reveals class of product, there appears to have been relatively little difference in the type of castings sold by large and small producers. The range in price within the two groups was about the same, with just a slightly larger percentage of large foundries selling higher-priced castings. Also there is no significant difference in general administrative and selling expenses, exclusive of officers's salaries. While it appears that small foundries had a larger part of each sales dollar going for general, administrative and selling expenses, other than officers' salaries, than did large foundries, they had a smaller part going for other manufacturing costs; and since it is known by observation that many small foundries classify most expenditures other than metal and labor as general expense, these differences in cost ratios may have little real meaning. They may represent principally differences in accounting practices, which were carried over into the reporting program despite OPA's instructions on classification of costs.

Differences Are Slight

All in all, the differences in cost ratios which appeared in 1944 among brass foundries of the several size groups are so slight as to be inconclusive. This may be because so many of the large companies of that year were really only small companies operating on a temporarily expanded scale. It may be because there is truly little difference in the production methods of the average large and small brass foundries.

If officers' compensation were included in costs in Table XXII, small foundries would unquestionably show higher general, administrative and selling expenses than large ones in this period. As noted already, officers' compensation is a legitimate cost of business and it is not a minor item for small foundries, even when one considers only the instances where the salaries paid to officers are reasonable in amount. Fair allowances for officers' salaries to be used in adjusting the cost and profit data in this table might range progressively from 7 per cent of net dollars sales for foundries with sales of less than $100,000 to 4 per cent for foundries with sales of $500,000 or more. This adjustment would leave small brass foundries showing higher total costs and lower profits than large brass foundries. The result would not be conclusive proof,

(*Continued on page 224*)

TABLE XXI—Average Operating Ratios of 27 Aluminum Foundries[1] Grouped by Size, 1944

Item	Foundries with 1944 Sales of: Less than $250,000	$250,000 and Over	All Foundries
Costs and Profits per Pound of Castings Sold			
Net sales realization	70.6c	88.7c	82.0c
Metal costs (including metal loss)	15.7	15.8	15.7
Production labor cost[2]	25.5	28.2	27.3
Other manufacturing costs[2]	9.9	18.7	15.4
Total manufacturing costs[2]	51.1	62.7	58.4
All other expenses[2]	10.6	8.1	9.1
Total costs[2]	61.7c	70.8c	67.5c
Profits and officers' compensation	8.9	17.9	14.5
Costs and Profits in Ratio to Net Dollar Sales			
Net sales realization	100.0%	100.0%	100.0%
Metal cost (including metal loss)	23.3	19.0	20.6
Production labor cost[2]	34.9	31.1	32.5
Other manufacturing costs[2]	14.2	20.6	18.1
Total manufacturing costs[2]	72.4	70.7	71.2
All other expenses[2]	13.6	8.5	10.5
Total costs[2]	86.0	79.2	81.7
Profits and officers' compensation	14.0	20.8	18.3

[1] Sample includes both single-line and multiple-line sellers. Latter class of foundry reported only costs applicable to sales of rough nonferrous castings. [2] Excludes any payments to officers or owners. Source: OPA Forms 677-2151 and 677-2152.

TABLE XXII—Average Operating Ratios of 94 Brass Foundries Grouped by Size, 1944

Item	Foundries with 1944 Sales of: Less than $100,000	$100,000-$250,000	$250,000-$500,000	$500,000- and over	All Foundries
Costs and Profits per Pound of Casting Sold					
Net sales realization	31.8c	33.8c	34.0c	35.5c	33.9c
Metal costs (including metal loss)	13.9	14.7	15.4	15.4	14.9
Production labor cost[1]	7.7	8.4	8.0	8.0	8.2
Other manufacturing costs[1]	4.2	4.2	4.3	6.0	4.5
All manufacturing costs[1]	25.8	27.3	27.7	29.4	27.6
All other expenses[1]	2.3	1.9	1.9	2.0	1.9
Total costs[1]	28.1c	29.2c	29.6c	31.4c	29.5c
Profits and officers' compensation	3.7	4.6	4.4	4.1	4.4
Costs and Profits in Ratio to Net Dollar Sales					
Net sales realization	100.0%	100.0%	100.0%	100.0%	100.0%
Metal costs (including metal loss)	44.3	44.6	46.3	45.0	45.1
Production labor cost[1]	24.1	24.5	23.5	21.8	23.8
Other manufacturing costs[1]	12.6	11.8	11.6	16.1	12.4
All manufacturing costs[1]	81.0	80.9	81.4	82.9	81.3
All other expenses[1]	7.7	5.9	5.9	5.4	6.1
Total costs[1]	88.7	86.8	87.3	88.3	87.4
Profits and officers' compensation	11.3	13.2	12.7	11.7	12.6

[1] Excludes any payments to officers or owners. Source: OPA Forms 677-2151 and 677-2152.

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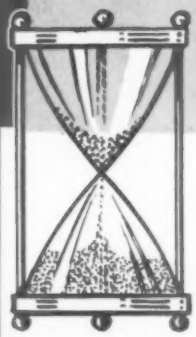

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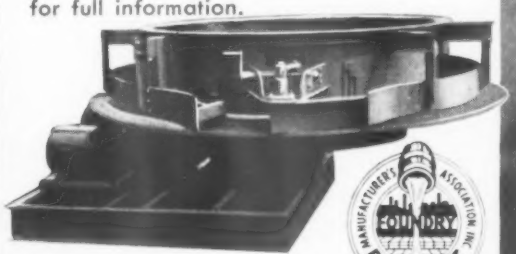

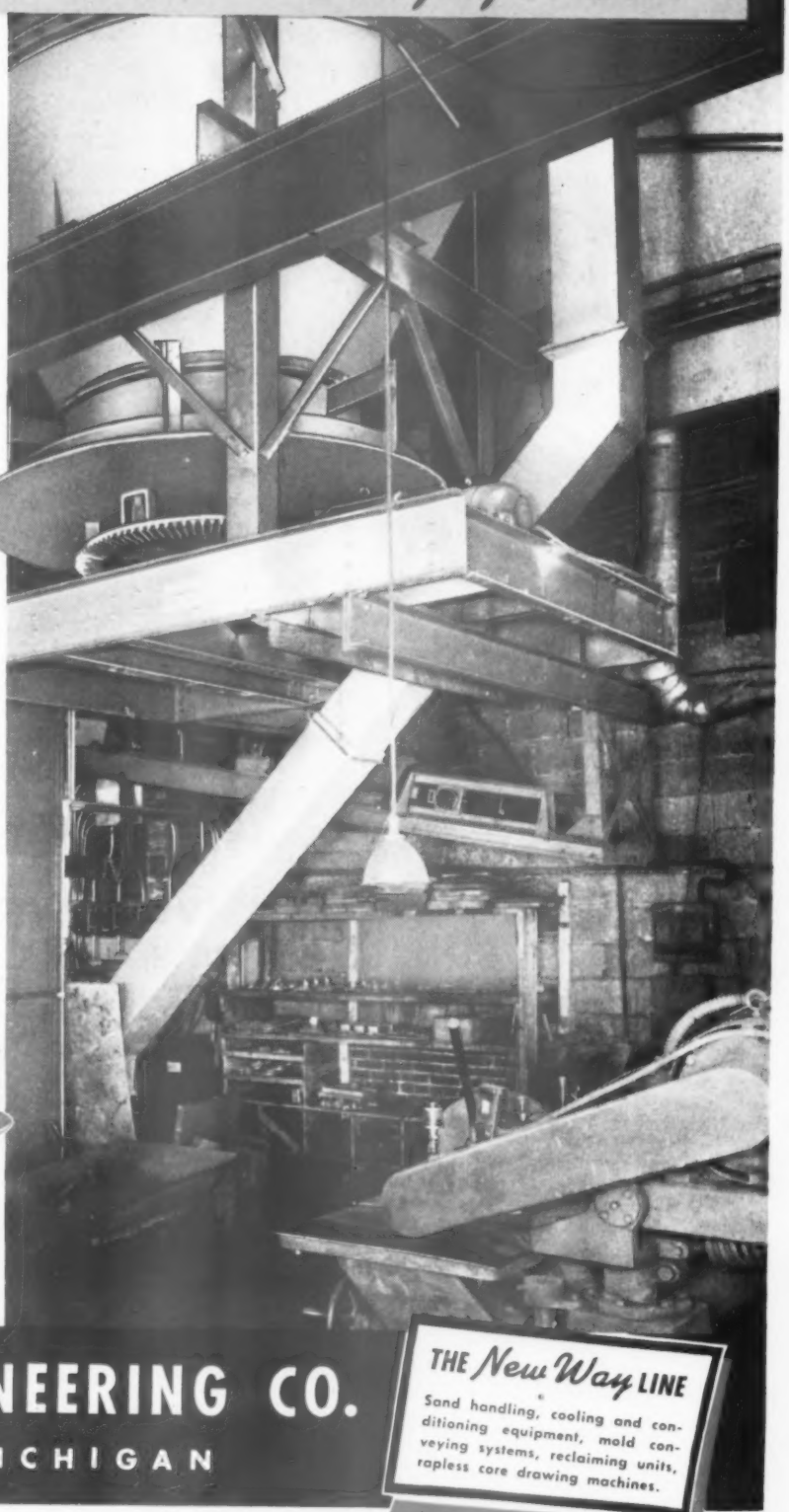

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Attention of Mr. C. W. Race

(*Continued from page* 222)

however, that large foundries are always more profitable than small. They show only relative profitability in one year. In 1943, with the same type of adjustment made for officers' salaries, small and large foundries appear to have been in about the same earnings position.

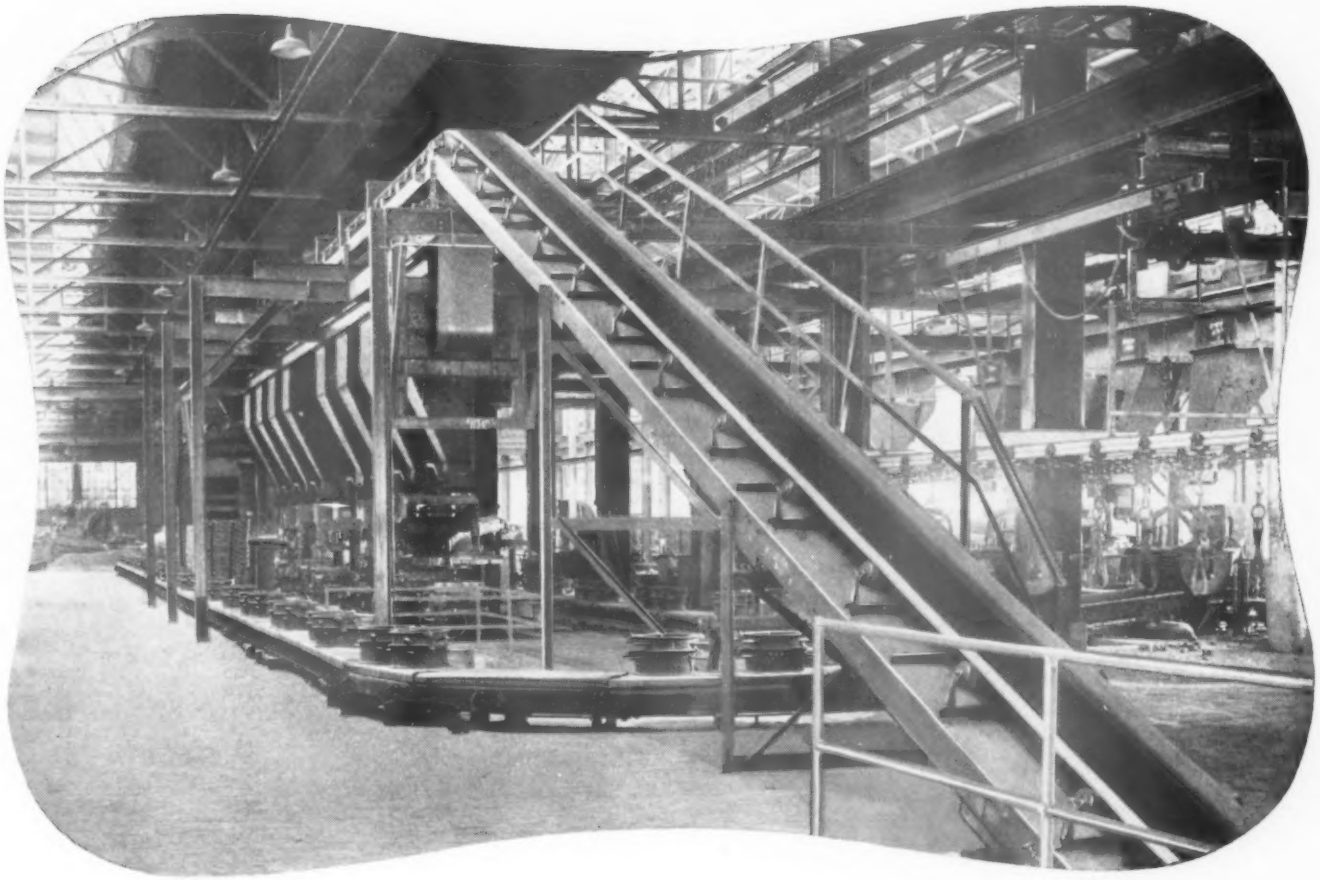
In this connection, it should be noted that many large foundries, particularly in the light metals and mixed metal fields, but also in the brass field, were subject to renegotiation of their war contracts and were required to repay to the federal government a portion of their wartime earnings. The profit information summarized in this report represents profits before renegotiation.

Figures Must Be Adjusted

Adjustment for officers' compensation is also needed before there can be any comparison of the relative profitability of the several classes of foundries shown in Table XX. The classes whose ratios of profits plus officers' compensation to sales would be least affected by removal of an allowance for officers' salaries than would be those in which large companies predominate, that is, the light metal and the specialized brass foundry groups. After such an adjustment, brass foundries other than specialized would appear to be the least profitable class in the industry, with mixed metal foundries and aluminum foundries the most profitable. Here again, though, the comparison would indicate conditions in a single year, when the demand for aluminum castings was abnormal both as to volume and type.

The need for an adjustment on officers' salaries even hinders to some extent a direct comparison of the profit rates of single-line and multiple-line brass foundries (other than specialized). The multiple-line sellers of brass castings which reported to OPA were larger, on the average, than reporting single-line sellers, even in terms of sales of rough nonferrous castings alone, and any adjustment for officers' salaries would be smaller for the first class than for the second. (Only large multiple-line sellers had records which permitted segregation of foundry costs, and the sample of multiple-line brass foundries was, by necessity, biased in favor of larger sellers). Even after adjustment for officers' salaries, however, multiple-line sellers of brass castings would continue to show a lower rate of profit on their sales of rough nonferrous castings than single-line sellers. The method by which these multiple-line sellers chose to allocate costs to nonferrous foundry operations may have had something to do with this result. It still may be a fact, though, that the profit margin of multiple-line sellers of rough copper-base castings is somewhat less than that of companies

(*Continued on page* 226)



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(*Continued from page 224*)

whose sole revenue comes from the sales of these products.

Enough has been shown as to the effect which type of product and volume of sales have upon cost ratios to make it understandable that changes in character of demand for foundry products during the war and changes in levels of production could easily be as important influences upon foundry operating ratios as any wage and price developments of the period. Changes in average cost and profit ratios over the period 1940-1946 show the net result of the operation of several, often contradictory, forces. They seldom show clearly the effect of any single development of the period.

In the case of brass foundries, because no extreme change in type of product occurred, wage and price changes may be traced in cost ratios with some degree of success. Table XXIII gives the average operating ratios of a sample of brass foundries which filed reports for the full period, 1940-1946. It will be seen that unit metal costs reflected the increases in metal prices that occurred in 1940 and 1941, before price controls were fully effective; the rollback of about 1c in the price of ingot that was required when MPR 202 (Brass and Bronze Ingot) was issued in August, 1942 (assuming this is an explanation of the drop in metal costs in 1943); and the 2-2½c increases in prices of all copper and copper-base metals that were granted in June, 1946. Unit labor costs reflect the gradual increase in wage levels brought about through wage rate increases, payments of overtime premiums upgrading of labor and decreased labor efficiency. A gradual increase in costs, other than metal and labor, is also shown. A good illustration of the effect of an expanded volume of production upon unit costs is found in the drop in these "other costs" in 1941.

For brass foundries, ratios of profits plus officers' compensation to both pound and dollar sales reached their peak in 1942. As was brought out in an earlier article, sales volume dropped in 1943 for a large proportion of brass foundries. For these companies, a reduced profit rate would be expected. Companies whose sales continued to expand in 1943, however, also showed a somewhat lower profit rate in that year than in 1942. The effects of slowly mounting costs were apparently beginning to be felt. Adjustment for officers' compensation does not alter the conclusion that 1942 was, on the average, the best year for brass foundries in terms of rate of earnings. Officers' salaries absorbed a smaller, not larger, proportion of net dollar sales in 1942 and 1943 than in 1940. The effect of adjusting for this item then would be only to make the increase in profit rates over the years 1940-1942 a sharper one.

Prices Were Higher

As of the third quarter 1946, brass foundries, judging from the representative sample here analyzed, were getting about 10c more per pound for their castings than they did in 1940. Metal costs were about 3c higher per pound, while labor costs were 5c higher. The ratio of profit plus officers' compensation to sales was somewhat reduced. Because dollar sales were holding above their level of 1940, however, dollar profits were still above the 1940 level.

In the case of aluminum foundries, changes in character of demand and in volume of business were the prime influences affecting cost and profit ratios over the period 1940-1946. Table XXIV gives average operating ratios for a sample of 11 large aluminum foundries. It will be seen that in the early part of the war period the effect of changes in type of product overshadowed everything else while, since the end of the war, the reduced volume of sales has been an equally important factor. As in the case of brass foundries, 1943 was the best year in terms of rate of profits.

The fact that OPA was obtaining monthly reports on sales and costs of nonferrous foundries made it possible to follow closely the developments within the industry which occurred at the war's end. Mention has already been made of the average ratios for moving quarterly periods, which were maintained by the office as a means of keeping abreast of current conditions. The operating ratios used in this analysis were (1) an index of dollar sales that measured sales in the most recent three-months' period against average quarterly sales in the first half of 1944; (2) net sales realization, or average price, per pound, which served as an index of changes in type of product; and (3) ratios of costs and profits to net dollar sales. Tables XXV and XXVI give such average ratios for a sample of 94 brass foundries, and the sample of 11 large aluminum foundries covered in Table XXIV.

It will be seen that these tables give details as to the impact of the end of the war upon foundry operations such as annual, semiannual or quarterly statements could never reveal. As sales fell off, both labor costs and costs other than metal and labor increased sharply in ratio to dollar sales. Profits and officers' compensation slumped. This was a temporary phase, however. By the first quarter of 1946, the profit ratio of both brass and aluminum foundries had somewhat recovered. The sudden improvement shown in this quarter does not stem en-

(*Concluded on page 228*)

TABLE XXIII—Average Operating Ratios of 40 Brass Foundries Selected Periods 1940—Third Quarter, 1946

Period	Net Sales Realization	Metal Cost (including metal loss)	Production Labor Cost[1]	All Other Costs[1]	Profits and Officers' Compensation
	Costs and Profits per Pound of Castings Sold				
1940	29.3c	12.8c	6.7c	5.6c	4.2c
1941	31.6	14.9	6.9	4.5	5.3
1942	32.9	15.0	7.2	4.6	6.1
1943	33.0	14.3	8.1	5.3	5.3
1944	34.0	14.7	8.2	6.3	4.8
1945	34.6	14.5	9.4	6.6	4.1
1st half, 1946	36.2	14.0	10.9	6.5	4.8
3rd quarter, 1946	39.5	16.1	11.7	6.9	4.8
	Costs and Profits in Ratio to Net Dollar Sales				
1940	100.0%	44.8%	22.3%	18.3%	14.6%
1941	100.0	48.3	21.2	14.1	16.4
1942	100.0	46.6	21.6	14.0	17.8
1943	100.0	44.5	24.2	15.8	15.5
1944	100.0	44.2	23.7	18.4	13.7
1945	100.0	43.2	26.6	18.8	11.4
1st half, 1946	100.0	40.1	29.5	18.0	12.4
3rd quarter, 1946	100.0	42.1	29.2	17.3	11.4

[1] Excludes any payments to officers or owners. Source: OPA Forms 677-668, 677-2151 and 2152.

TABLE XXIV—Average Operating Ratios of 11 Large Aluminum Foundries[1] in Selected Periods 1940—Third Quarter, 1946

Period	Net Sales realization	Metal Cost (including metal loss)	Production Labor Cost[2]	All Other Costs[2]	Profits and Officers' Compensation
	Costs and Profits per Pound of Castings Sold				
1940	59.1c	17.4c	16.2c	11.6c	13.9c
1941	70.4	19.2	19.0	12.6	19.6
1942	80.0	16.9	24.0	16.1	23.0
1943	82.2	17.6	28.5	17.1	19.0
1944	83.4	15.3	27.9	21.6	18.6
1945	74.2	14.9	25.9	23.3	10.1
1st half, 1946	61.3	13.1	22.3	20.0	5.9
3rd quarter, 1946	60.2	13.7	21.7	18.7	6.1
	Costs and Profits in Ratio to Net Dollar Sales				
1940	100.0%	34.3%	25.7%	18.7%	21.3%
1941	100.0	31.8	26.5	16.3	25.4
1942	100.0	24.0	28.4	20.1	27.5
1943	100.0	22.9	33.2	20.5	23.4
1944	100.0	20.0	32.1	24.9	23.0
1945	100.0	21.2	32.8	31.3	14.7
1st half, 1946	100.0	23.6	33.8	36.2	6.4
3rd quarter, 1946	100.0	25.3	33.2	34.5	7.0

[1] Foundries selling $250,000 or more of rough nonferrous castings in 1944. Both multiple-line and single-line sellers are included in this sample. [2] Excludes any payments to officers or owners. Source: OPA Forms 677-668, 677-2151 and 2152.

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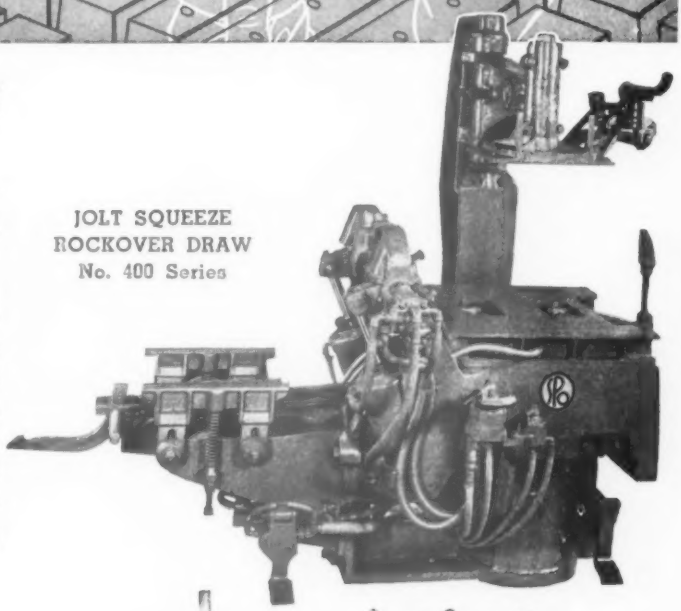

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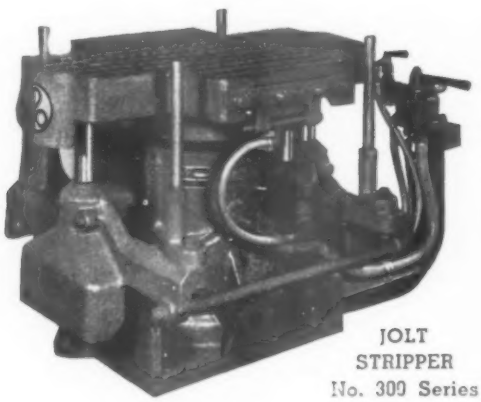

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(*Concluded from page 226*)

tirely from a change in operating conditions. Reference to the last quarter of 1944 and the two following periods will show any quarter containing the month of December has a relatively low profit rate and relatively high labor costs and other costs, due solely to the inclusion of year-end adjustments in December cost figures.

TABLE XXV—Averages of Selected Operating Ratios of 94 Brass Foundries[1], Quarterly Moving Periods, May-July, 1944, Through July-September, 1946

Period	Index of Dollar Sales[2]	—Ratios, in Per Cent, to Net Dollar Sales— Metal Cost (including metal loss)	Production Labor Cost[3]	All Other Costs[3]	Profits & Officers' Compensation	Net Sales Realization (cents per pound)
January-June, 1944	100	45.6%	23.2%	17.8%	13.4%	33.9c
Quarterly Moving Periods						
May-July, 1944	97	45.7	23.7	18.2	12.4	33.8
June-Aug., 1944	97	44.8	24.1	17.9	13.2	33.9
July-Sept., 1944	95	44.6	24.8	18.2	12.4	34.2
Aug.-Oct., 1944	102	44.4	24.2	17.9	13.5	34.3
Sept.-Nov., 1944	102	45.1	24.4	19.0	11.5	34.4
Oct.-Dec., 1944	101	45.0	25.2	20.5	9.3	34.2
Nov., 1944-Jan., 1945	98	44.6	25.8	20.4	9.2	34.2
Dec., 1944-Feb., 1945	95	44.6	26.1	20.2	9.1	34.7
Jan.-March, 1945	100	44.8	25.6	18.8	10.8	34.9
Feb.-April, 1945	99	44.8	25.2	19.3	10.7	35.5
March-May, 1945	102	44.8	24.9	18.8	11.5	34.1
April-June, 1945	97	43.9	25.4	19.2	11.5	34.0
May-July, 1945	88	44.3	25.8	19.0	10.9	34.4
June-Aug., 1945	84	43.6	27.2	19.8	9.3	35.1
July-Sept., 1945	76	43.7	28.1	20.5	7.7	34.9
Aug.-Oct., 1945	75	43.0	28.4	21.0	7.6	35.0
Sept.-Nov., 1945	73	43.4	29.5	23.0	4.1	34.9
Oct.-Dec., 1945	73	42.6	30.7	23.9	2.8	35.2
Nov., 1945-Jan., 1946	73	43.0	30.6	23.9	2.5	35.7
Dec., 1945-Feb., 1946	72	43.3	30.7	24.6	1.4	35.7
Jan.-March, 1946	82	42.3	28.8	20.0	8.9	35.8
Feb.-April, 1946	83	43.1	28.2	20.3	8.4	36.0
March-May, 1946	89	41.7	28.8	19.5	10.0	36.2
April-June, 1946	93	42.2	29.1	19.3	9.4	37.1
May-July, 1946	89	43.3	29.4	19.0	8.3	38.1
June-Aug., 1946	92	43.6	29.1	19.0	8.3	39.0
July-Sept., 1946	90	43.9	30.2	19.8	6.1	39.1

[1] Averages for latest periods are based on reports from about 75 companies. [2] Quarterly average in first half 1944 equals 100. [3] Excludes any payments to officers or owners. Source: OPA Forms 677-2151 and 2152.

TABLE XXVI—Averages of Selected Operating Ratios of 11 Large Aluminum Foundries[1] Quarterly Moving Periods, May-July, 1944 through July-September, 1946

Period	Index of Dollar Sales[2]	—Ratios, in Per Cent, to Net Dollar Sales— Metal Costs (including metal loss)	Production Labor Cost[3]	All Other Costs[3]	Profits & Officers' Compensation	Net Sales Realization (cents per pound)
Jan.-June, 1944	100	20.5%	31.0%	22.6%	25.9%	85.7c
Quarterly Moving Periods						
May-July, 1944	95	20.4	31.4	25.2	23.0	85.1
June-Aug., 1944	94	19.8	31.6	26.3	22.3	84.0
July-Sept., 1944	90	19.7	33.1	27.8	19.4	82.7
Aug.Oct., 1944	92	19.3	32.4	25.6	22.7	81.7
Sept.-Nov., 1944	89	19.7	32.7	25.6	22.0	81.1
Oct.-Dec., 1944	87	19.2	33.9	27.8	19.1	80.1
Nov., 1944-Jan., 1945	86	19.9	34.2	28.8	17.1	79.4
Dec., 1944-Feb., 1945	84	20.3	34.2	28.9	16.6	78.5
Jan.-March., 1945	91	20.9	31.6	26.4	21.1	78.6
Feb.-April, 1945	91	21.1	31.0	26.7	21.2	78.0
March-May, 1945	91	21.0	31.0	26.9	21.1	77.0
April-June, 1945	84	21.2	31.0	28.2	19.6	78.6
May-July, 1945	75	21.5	32.1	30.2	16.2	73.7
June-Aug., 1945	66	22.0	33.6	33.3	11.1	72.5
July-Sept., 1945	52	22.4	35.6	37.7	4.3	70.3
Aug.-Oct., 1945	45	22.1	38.0	43.3	3.4*	68.6
Sept.-Nov., 1945	40	22.4	37.9	47.9	8.2*	65.5
Oct.-Dec., 1945	40	22.8	38.8	53.1	14.7*	63.6
Nov., 1945-Jan., 1946	42	23.6	37.7	49.0	10.3*	62.5
Dec., 1945-Feb., 1946	45	23.8	36.4	44.9	5.1*	62.5
Jan.-March, 1946	53	24.0	35.0	37.2	3.8	61.6
Feb.-April, 1946	58	23.6	34.5	36.1	5.8	61.5
March-May, 1946	64	23.6	34.3	37.3	4.8	61.4
April-June, 1946	66	23.1	33.0	35.7	8.2	61.4
May-July, 1946	61	24.1	34.0	38.5	3.1	61.3
June-Aug., 1946	63	24.8	33.5	35.4	6.3	60.5
July-Sept., 1946	64	25.3	33.2	34.5	7.0	60.2

* Indicates deficit. [1] See Footnote 1 of Table XXIV. [2] Quarterly average in first half 1944 equals 100. [3] Excludes any payments to officers or owners. Source: OPA Forms 677-2151 and 677-2152.

HEAT ABSORPTION OF MOLDING SAND

(*Continued from page 85*)

and also the heat transfer variation due to physical conditions at metal-mold interface, one can then simplify heat transfer within a mold by dealing only with temperature and density (weight per cubic foot) of rammed sand.

Heat conductivity test data for the four rammed sand samples are tabulated in Table II. Since heat conductivity test data are better revealed in the form of graphs our data will be presented by this means.

Heat Absorption vs. Grain Size—The coarser the sand, the heavier will the sand be in the rammed condition, providing other conditions such as mold hardness and composition are constant. Thus the heat absorption of a coarse sand is greater than that of a fine sand for a given composition when rammed to a chosen mold hardness. For example, compare the heat conductivity curves for sample No. 1 and sample No. 2 in Fig. 1. Both of these sands were rammed to a mold hardness of 63 and then dried at 212° F. Sample No. 1 is composed of a coarse grade sand of thru 30 mesh and retained on 40 mesh sand grains, while the No. 2 sand is thru 100 mesh and retained on 140 mesh. Heat absorption power of the coarse sand No. 1 is materially greater than that of the fine sand No. 2. This is principally because the coarse sand No. 1 weighed 100.6 lb per cubic foot compared with 89.7 lb per cubic foot for the fine sand No. 2. Thus a coarse sand will cool molten metal and a casting faster than a fine sand providing both types of sand are rammed to the same degree of mold hardness.

Heat Absorption vs. Mold Hardness—The density, or weight per cubic foot, of a rammed sand of a given composition changes with mold hardness. Thus it is to be expected that a change in mold hardness will change the heat absorption.

It is possible to ram a coarse sand such as sand No. 1, Fig. 1, to low enough mold hardness so that the weight per cubic foot equals that of a fine sand such as No. 2, Fig. 1. For example, when the mold hardness of coarse No. 1 sand is changed from 63 to 50 then the weight per cubic foot as rammed will be 89.7 (sample No. 1A, Fig. 1) equaling the weight per cubic foot of the fine sand (No. 2, Fig. 1) when it is rammed to 63.

Since the weights per cubic foot of these two sands were made equal by a difference in mold hardness, one could expect the heat conductivity or heat absorption to be equal. Referring to heat

(*Continued on page 230*)

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(*Continued from page 228*)

conductivity test curves Fig. 1 of samples 1, 1A, and 2, it may be noted that for all practical purposes the heat absorption is the same for the sample No. 1A, 30 mesh sand, and sample No. 2, 100 mesh sand—providing sand No. 1A is rammed to a mold hardness of 50 and sample No. 2 is rammed to a mold hardness of 63. This causes both sands to weigh 89.7 lb per cubic foot. Thus a coarse sand may be rammed light enough to have a heat absorption as low as a fine sand rammed hard.

Explains Cold-shut Defects

This explains why a cold-shut or tendency towards cold-shut defects is obtained frequently when a mold is rammed very hard. The cold shut is not necessarily the effect of high mold gas pressure, as some might feel, but the high heat absorption of a densely rammed sand absorbed sufficient heat from the low temperature metal to cause a cold shut.

With an increase in pouring temperature of the molten metal, the sand becomes heated to a higher temperature. The higher the temperature to which a sand is heated, the more heat the sand will absorb. At low temperatures, such as 200° F, sand is a fairly good insulator but at high temperatures, such as 2500° F, the sand becomes a poor insulator. Thus at high pouring temperatures the mold face absorbs heat readily and becomes heated to high temperatures, taxing the refractoriness of the sand.

Heat Absorption vs. Weight—The heat flow curves in Fig. 2 illustrate the relationship between the weight of sand per cubic foot and heat conductivity. A study of this data shows that as the weight of the rammed sand is increased, the heat absorption power of the sand materially increases. This holds true at any temperature from room to such high temperatures as 2500° F.

The weight per cubic foot of a rammed sand may change due to a change in grain size, mold hardness or composition of the sand.

Conclusion — The authors recognize that the data submitted in this paper are insufficient to draw definite conclusive statements on the subject of heat flow in molding sands. They do feel, however, that data as shown will have the effect of encouraging other workers to study this subject matter. The data has another value in that at least some actual test data are available on heat flow in molding sands of known physical properties.

One very practical observation is that as mold hardness of a mold is increased, the heat absorption increases rapidly. Using weight of the sand per

(*Concluded on page 232*)

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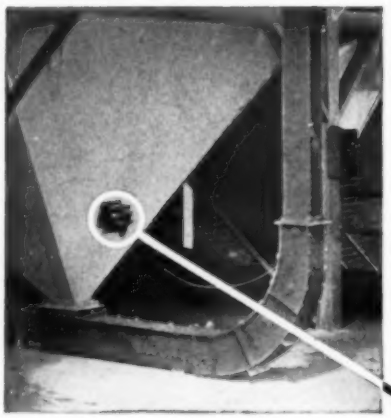

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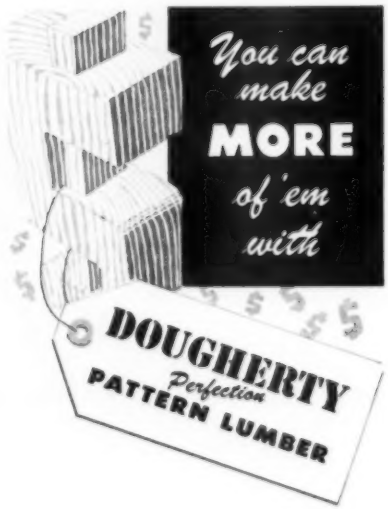

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LUMBER COMPANY

(*Concluded from page 230*)

cubic foot as the index of ramming, the following holds: At 2500° F temperature, the heat flow can be substantially doubled by increasing the weight of the sand 25 per cent per cubic foot. As temperature decreases, this difference in heat flow is materially reduced. In the foundry, one has often observed that excessively hard ramming will cold shut light sections of a casting. This cold-shut defect may be due to high heat absorption of densely rammed sand.

When the pouring temperature of molten metal is increased, the sand becomes a poorer insulator, absorbing more heat and causing the sand to reach a high temperature quickly.

For a given mold hardness, a coarse sand will subtract more heat from a casting than a fine sand, due to the greater density weight per cubic foot.

The chilling action of a mold will be greater as the density of the molding material increases. The density weight per cubic foot is increased by: 1. Grain distribution. 2. Heavy grain material such as zirconite. 3. High specific heat of molding material. 4. Coarse grain size.

The foregoing conclusions are limited to dried molding sand prepared from Ottawa silica sand and bonded with western bentonite. The effect of gas volume, grain surface, atmosphere, heat by convection and metal-sand interface influence are recognized as important, but were excluded from the discussion in this paper for purposes of simplification. More work needs to be done before a final and complete treatise can be prepared.

Book Review

Work Measurement Manual, third edition, By Ralph M. Barnes, paper, 218 pages, 8½ x 11 in., published by Wm. C. Brown Co, 973 Main St., Dubuque, Iowa. Price $3.75.

This book explains briefly the importance of time study, the procedure commonly used in making a time study, the work measurement investigations now being conducted by Professor Barnes, and some of the preliminary findings. It tells how to conduct a community time study survey and gives the results of two such surveys. This manual will serve as a guide for those interested in improving the ability of time study men to set accurate and consistent time standards.

The book also contains a section on the use of standard motion-time data for such operations as punch presses, hand screw machines, turret lathes, sensitive drills and hand tappers.

The final section of the book gives a full report by companies of an industrial engineering survey recently made by Professor Barnes.

Question? Answer!

¶ *How can I make my sand shake out EASILY?*

Use Dixie Bond. Those hard baked lumps are caused by excessive dry strength. Dixie gives moderate dry strength. That means easy, fast shake-out, less abuse of flasks and soft sand which is easily reconditioned.

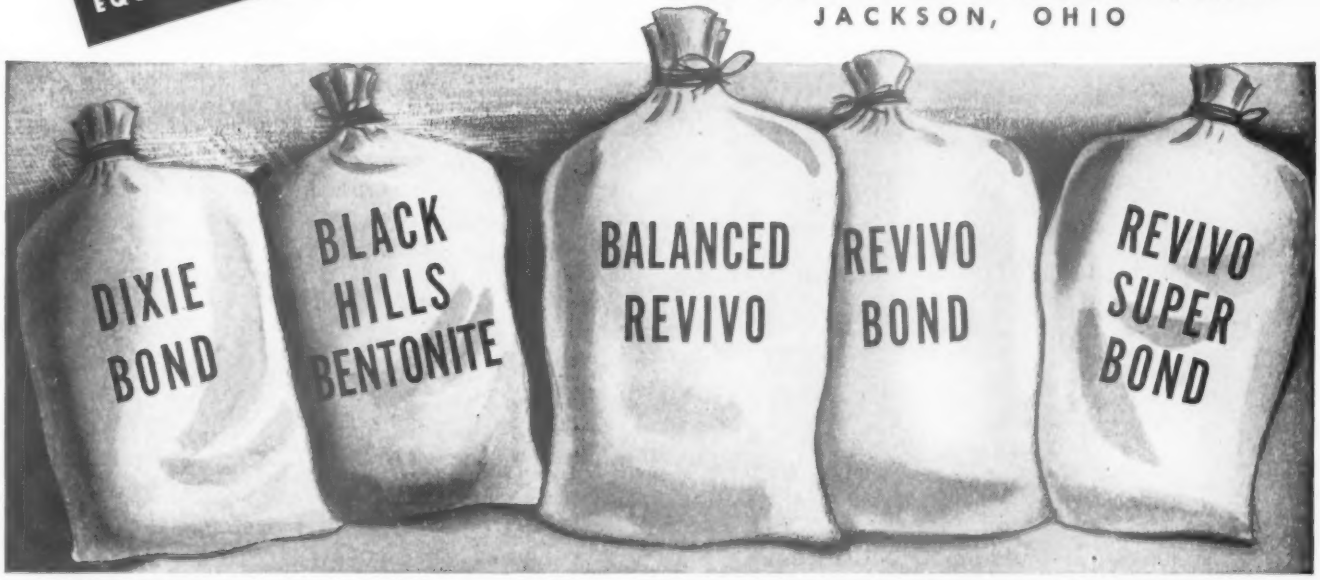
Also, you get maximum green strength and high flowability. That means less clay, higher permeability, and sound, hard molds with fewer jolts. Dixie eliminates cracked castings due to sand and improves casting finish.

★ ★ ★

¶ Dixie Bond, however, does not fit *all* requirements. Where conditions demand, we recommend one of four other ECP bonding clays or combinations thereof. Bulletins free.

EASTERN CLAY PRODUCTS, INC.
JACKSON, OHIO

Remember
NO ONE BONDING CLAY WILL DO ALL JOBS EQUALLY WELL!



ECP

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

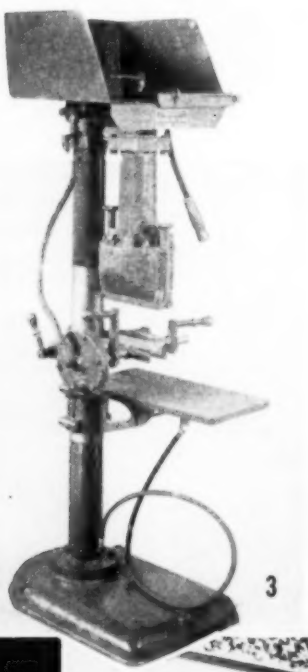
All TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

New Equipment and Supplies

(1)—Moisture Tester: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Portable electric moisture tester is designed for moisture determination of foundry sands prepared by the batch, continuous, pile or floor method. The sand sample under test is held within a curved sampling plate and compressed to a definite degree by a spring loaded arm. As the tester is pushed into the sand, the sand slides through the sample cup and wipes the electrodes giving a moisture reading at any depth up to 25 in. Adjustments may be made to compensate for sand temperature and for the varying electrical characteristics of each type of sand.

1



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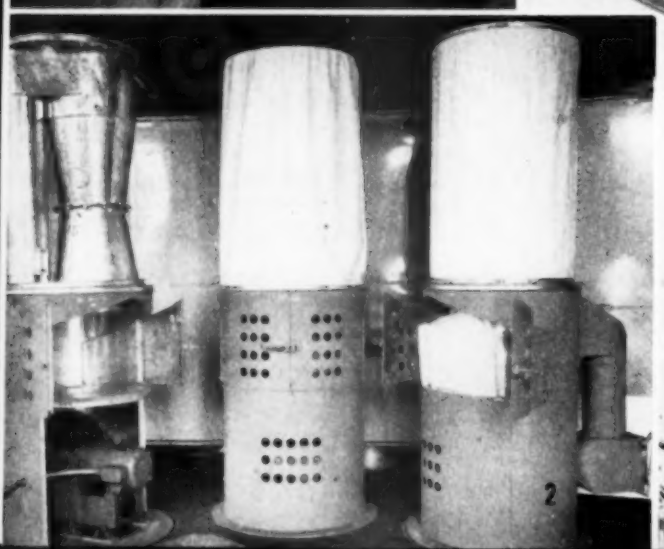

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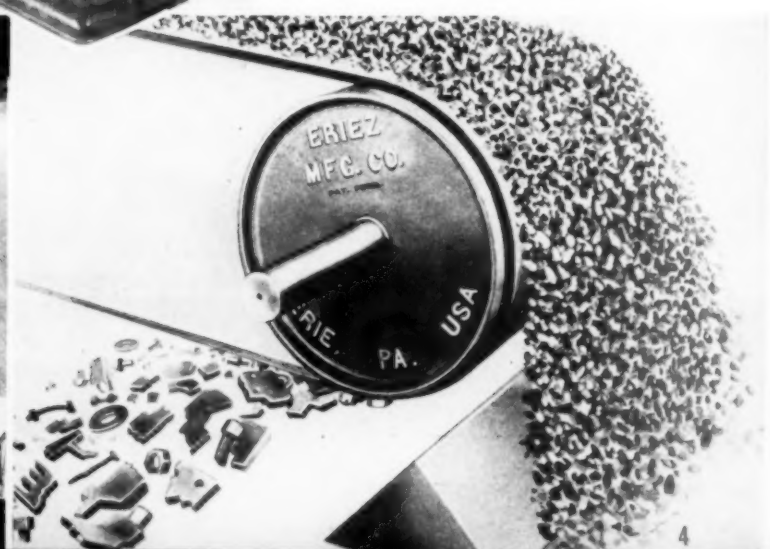


4

(2)—Dust Control: Kirk & Blum Mfg. Co., 2808 Spring Grove Ave., Cincinnati 25—Self-contained dust control unit may be placed in buildings not served by a central dust control system or in isolated parts of the main plant. It is designed to handle sawdust and shavings from woodworking machines, grinding, buffing and polishing dirt from metalworking machines and similar dust sources. Features include an air volume of 900 cfm at 2 in. suction, capacity for four 3-in., two 4-in., or one 6-in. pipe connections and a 4-cu-ft storage compartment in addition to being semi-automatic in its cleaning operation.

(3)—Core Blower: Interstate Pattern & Machine Co., 4431 Fifth Ave., Rock Island, Ill.—New core blowing machine is designed for horizontally split boxes. It is fully automatic, has an effective clamping area of 35 sq in. and simple blow and exhaust valves. Blow plates of 2½ x 10 in., 10 x 10 in. and 10 x 12 in. are interchangeable. All adjustments on the machine can be made without a wrench.

(4)—Magnetic Pulley: Eriez Mfg. Co., 2702 East 12th St., Erie, Pa.—Self-energized magnetic pulley requiring no electric current to generate a magnetic field is designed for the automatic separation of magnetic from nonmagnetic materials conveyed on a belt. Pulley is said to have been used effectively in conjunction with foundry mold shakeout machines in removing iron fins, particles and gaggers from the sand as it is elevated over the shakeout screen to be conditioned for reuse.

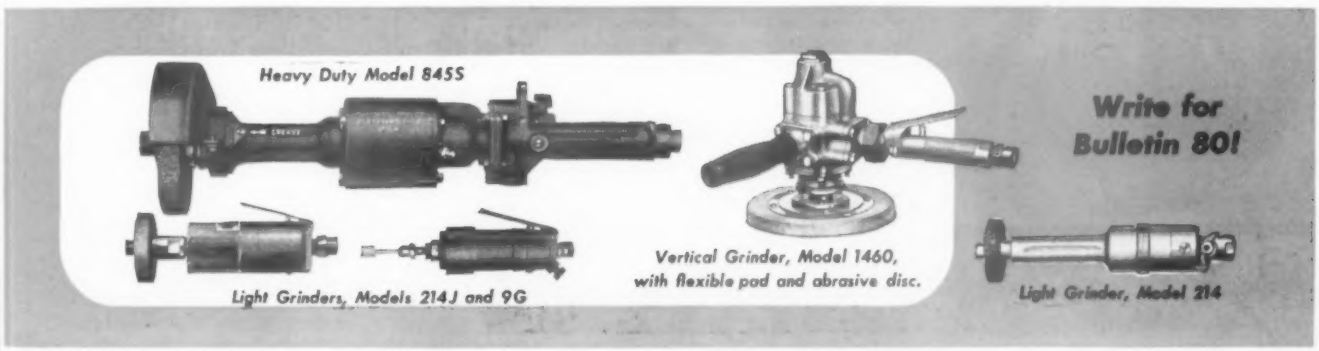
Buffing Machine: Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4 — Two-motor buffing and polishing machine has 13 in. overhang base for convenience in handling large or bulky work. Machine has two spindles

(*Continued on page 236*)

You get plenty of power from easily-held, smooth-running *CLECO GRINDERS*

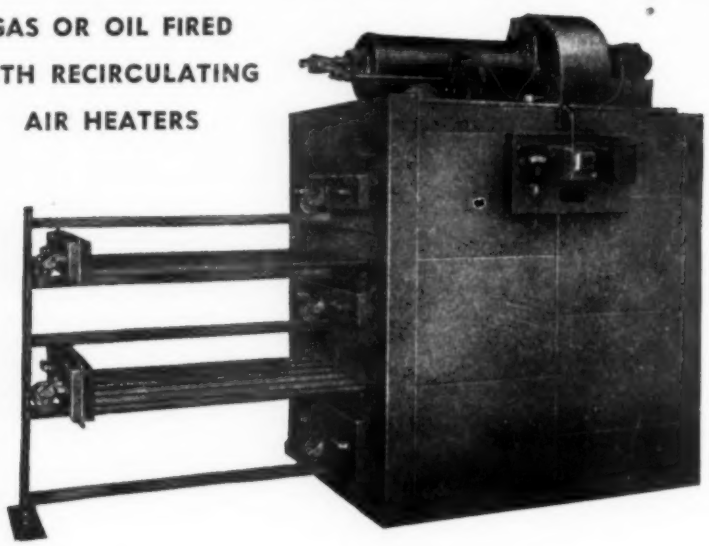
FROM "snagging" in the cleaning room to light finishing on forgings, dies, etc., you will find the *right* model for *every* job in the extensive line of Cleco Rotary Grinders. These grinders feature rugged alloy steel rotors, heat treated and ground to exact size — insuring vibration free operation at all speeds. Governors efficiently control the speed, whether idling or under varying loads, providing ample power at all times plus utmost economy in air consumption. Highest grade ball bearings are used throughout. An efficient lubrication system helps increase the life of the tools. Bulletin 80 describes Cleco Grinders in detail and includes a large blueprint of construction details. *Ask for it!*

Cleco **PNEUMATIC TOOL DIVISION**
of THE REED ROLLER BIT COMPANY
P. O. BOX 2119 • HOUSTON 1, TEXAS


Heavy Duty Model 845S
Light Grinders, Models 214J and 9G
Vertical Grinder, Model 1460, with flexible pad and abrasive disc.
Write for Bulletin 80!
Light Grinder, Model 214

PORBECK DRAWER TYPE OVENS

GAS OR OIL FIRED
WITH RECIRCULATING
AIR HEATERS



UNIFORM CORES CONTINUOUSLY WITH LOW COST OPERATION

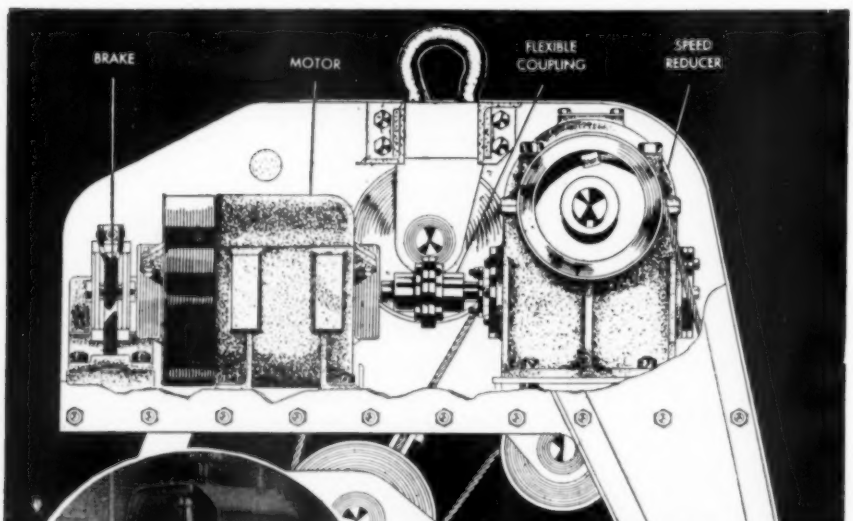
Strictly a *production* unit—note that all drawers operate independently of each other. Comes completely equipped with latest type temperature indicating controls (variable 100° to 650° F) and high efficiency recirculating air heater. Sturdy construction with 4-1/2" fibre-glass insulation throughout. Users commend Porbeck ovens for their space and time saving features. Available in several types and sizes. We invite your inquiry.

WRITE FOR NEW CORE OVEN BULLETIN "F"

PORBECK MANUFACTURING CO.

Manufacturers since 1894 of Core Ovens, Mold Dryers, Processing Ovens, Mold Drying Ovens, Heat Treating Ovens, and Paint Baking Ovens.

2600 N. Ninth St. **St. Louis 6, Missouri**



HOOK 'ER ON—PLUG 'ER IN

ABOVE YOU SEE WHY the Erie Electric Bucket works in its own headroom controlled from the crane cab. This sturdily constructed bucket needs only to be hooked over the crane hook and power line plugged in. The man in the cab controls the opening of the bucket from cracking the lips to any degree of opening or closing. The extra in-built weight permits easy penetration. *Write for complete particulars.*

ERIE STEEL CONSTRUCTION CO
1079 GEIST ROAD • ERIE PA

ERIE BUCKETS THE MOST COMPLETE LINE BUILT

» ALSO AGGREMETERS
ELECTRIC OVERHEAD CRANES
PORTABLE CONCRETE PLANTS

(*Continued from page 234*)

operating independently with separate motors and multiple v-belt drives. Sizes include 2 to 15 hp motors with spindle speeds to user's specification or with adjustable control for spindle speeds of 1500 to 3000 rpm. Hand brake for stopping spindle or an arrangement for shutting off the current and stopping the spindle are optional.

Cranes: Downs Crane & Hoist Co., 540 West Vernon Ave., Los Angeles 37—Complete line of cranes ranging from small job to double-girder overhead traveling cranes are available complete or in unit parts. Unit parts are completely assembled and ready for attachment to structural members which can be fabri-

cated in most shops. All parts have a safety factor of five or better and are furnished with cut gears, pressure-gun lubrication and ball or roller bearings. Engineering, design and shop drawings for any type of crane can be purchased to enable a company to fabricate its own crane.

Electrode: Wilson Welders & Metals Co. Inc., 60 East 42nd St., New York 17—Complete line of stainless steel electrodes in a full range of grades and diameters are furnished with a heavy extruded lime type coating for dc application. In addition, all but the straight chrome analyses are obtainable with a lime-titania type coating for ac and dc. Slag produced by either of these coatings is claimed to be easily removed.

Tractors: Trackson Co., 3333 South Chase Ave., Milwaukee 1—Company's Model T6 tractor-excavator combines the usefulness of a shovel, loader, scraper and bulldozer and will handle various kinds of digging, dirt moving and material handling jobs. Buckets of 1½ or 1¾ cu yd capacity are standard equipment, and other buckets for special uses can be supplied. A bulldozer blade, quickly interchangeable with the bucket,

(*Continued on page 238*)

3/8" 1/2" 5/8"

A Full Range of Sizes for All Match Plate Requirements Is Available From Stock

3/4" 7/8" 1 1/4"

CLEVELAND *Type* 'SA' MATCH PLATE VIBRATOR

A precision built vibrator that is acclaimed by foundrymen as the most efficient they have ever used . . . a vibrator that gives them fewer headaches. Hard-chrome plated pistons, that have been heat treated and precision ground, are expertly fitted in square, chromed-steel bodies . . . resulting in smooth, fast operation with a minimum of wear. We have enjoyed an excellent reputation for twenty odd years as manufacturers of quality vibrators, and in that time have constantly bettered the product until today our Type "SA" vibrator embodies all the best features that can be incorporated in a practical plate vibrator . . . WE CAN PROVE CLEVELAND'S ARE BEST!

Information on stud or special head mountings is available on request.

CLEVELAND VIBRATOR COMPANY

★ 2828 Clinton Avenue Cleveland 13, Ohio ★

ORDER "National" BRAND

HIGHEST QUALITY FOUNDRY BENTONITE

Prompt shipment—unlimited quantities of high grade bentonite now available to foundries from BAROID—the world's largest producer of bentonite. Our plants are geared to meet every requirement of the foundry trade.

Order "NATIONAL" Brand

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You can do any of these jobs FASTER-EASIER-BETTER with Strand Flexible Shaft Machines

Grinding · buffing · polishing · sanding
drilling · reaming · rotary filing · wire
brushing · screw driving · nut setting
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Strand machines provide PORTABLE rotary power at CONSTANT speeds with dependable results and less operator fatigue. Ruggedly built for years of steady use. Hundreds of attachments easily interchanged—125 types and sizes—vertical and horizontal models from ⅛ to 3 H.P.

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Send for CATALOG showing complete line

M-5

Strand FLEXIBLE SHAFTS

N. A. STRAND & CO.
5010 NO. WOLCOTT AVE.
CHICAGO 40, ILL.

(*Continued from page* 236)

is also available. Company makes three additional sizes of tractors with bucket sizes from 1/2 to 4 cu yd.

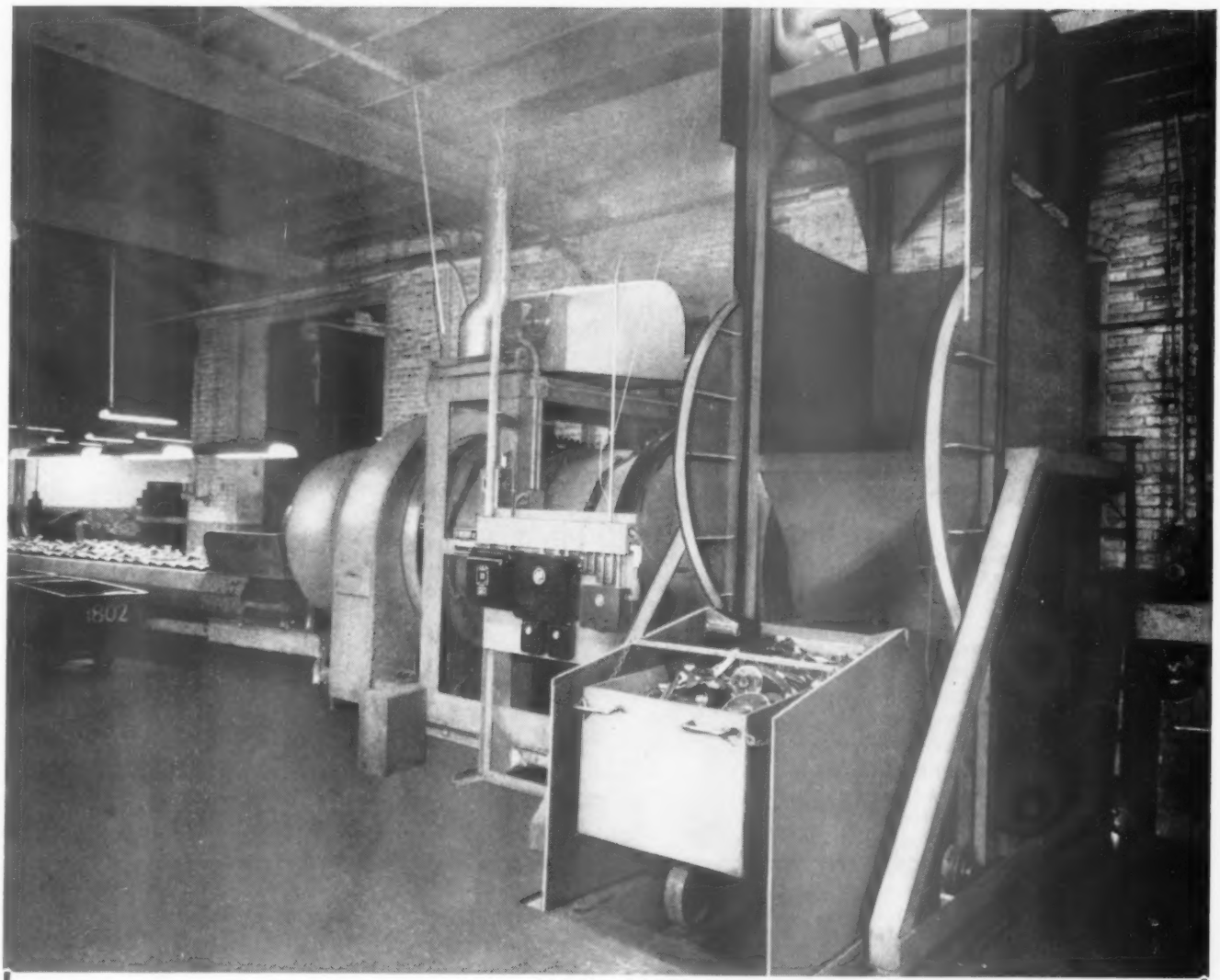
Blowers: Bryant Heater Co., Industrial Division, 1020 London Rd., Cleveland 10—Direct-connected centrifugal blowers are constructed of aluminum housings, bases and side plates, with light-weight steel impeller for smooth, quiet operation and low bearing load. Three-point mounting base simplifies mounting and leveling, and flanged outlet connection eliminates need for pipe unions in the air line. Any

one of seven outlet positions may be used. Blowers are available from 2 to 6 in. outlet pipe size, supplying 100 to 525 cfm at 4 oz pressure and in 2 and 3 in. outlet sizes furnishing 125 cfm at 18 oz and 275 cfm at 16 oz, respectively. Motors range from 1/3 to 2 hp.

Grinder: Bradford Machine Tool Co., 657 Evans St., Cincinnati 4—Carbide tool grinder has a regular grinder for rough work on one side and a cup wheel for accurate finish grinding on the other. Precision machined work table is adjustable to desired angles and to height and wheel wear. Grinder is equipped with eye shield, tool tray, water pot, and guards with exhaust connections. Motor is totally enclosed to NEMA Specifications and is available in 220, 440 or 550 v, 2 or 3 phase, 50 or 60 cycle sizes.

Dust Viewer: Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8—Microprojector is designed to simplify the determination of numerical concentrations of impinger and precipitator dust samples. It eliminates time-consuming direct microscope counting of dust particles and eyestrain. Used in conjunction with a standard microscope the viewer projects the microscopic field image on a ruled, translucent screen, 200 x 250 mm, with

(*Continued on page* 240)



RANSOHOFF AUTOMATIC STAR-RETURN WET CLEANING MILLS

The Lowest Cost Method of Cleaning Castings

ONE way to make more profit is the RANSOHOFF WAY to clean castings. It's a money-saver and the lowest cost method used by foundries, great or small, from coast to coast. A claim . . . not a boast . . . which is proved every day.

For example, this 60"x72" end-loading, end-unloading wet cleaning mill is cleaning agricultural implement parts thoroughly and quickly.

RANSOHOFF . . . THE BIGGEST NAME IN ENGINEERED CLEANING

Save 30% to 70% ON YOUR CLEANING COSTS

Mills designed, engineered and constructed to solve your cleaning problem. Ask our engineers to call.

SEND US A SAMPLE BATCH FOR FREE TESTS AND REPORTS

NO DUST, NO RUST, NO MANUAL HANDLING, NO BREAKAGE, NO NICKING, NO EXCESSIVE MILL WEAR

MEMBER MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

N. RANSOHOFF, Inc.

TOWNSHIP AND BIG 4 RR CINCINNATI 16, OHIO

"HOUSEKEEPING"

Hundreds of leading foundries throughout the country have set up good "housekeeping" with an American Core Rod Straightener and Shear Machine. Since the installation of this compact, versatile unit sprawling scrap piles have been cleaned up; discarded core rods have been reclaimed; and expensive hand labor has been reduced as much as 75% in many instances. As a direct result, this type of foundry "housekeeping" has paid off by lowering labor costs . . . minimizing stock purchases . . . and providing floor space for other production purposes.

With a Rod Straightener one man can easily do the work of four, straightening bent core rods as fast as they are fed into the machine. The use of skilled labor is not necessary. The machine also shears quickly and cleanly, and forms gaggers accurately in one operation. Four models are available for foundries of every size.

For complete details on the American Rod Machine and how its "housekeeping" methods can help improve your foundry, write today for Bulletin No. 10-A.

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
505 S. Byrkit St. Mishawaka, Indiana
CORE ROD STRAIGHTENER

(*Continued from page 238*)

a magnification of 1000 diam. It is portable and may be used in the field as well as laboratory. Light is provided by a dependable tungsten-mercury arc lamp.

Flexible Shaft Grinder:

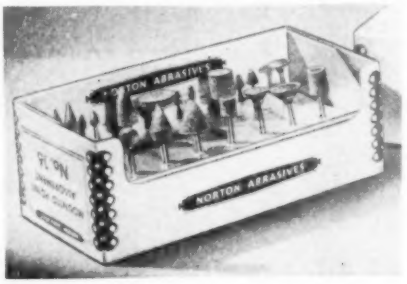
Wyzenbeek & Staff Inc., 838 West Hubbard St., Chicago 22—Multispeed flexible shaft machine is constructed of welded steel with pulleys and belts enclosed. Machine has low center of gravity, and cabinet swivels on ball bearing motor base. It is available in five models of ½ to 1 hp with rpm varying from 1400 to 6000.

Fork Truck: Clark Trucktractor, Division of Clark Equipment Co., 258 West Champion St., Battle Creek, Mich. —Pneumatic tired fork lift truck designed for working outdoors and on uneven surfaces has capacity of 4000 lb at 24 in. and 120 in. lift with 85½ in.

overall height. Truck is 42 in. wide. It is maneuverable and provides speed of 9.4 mph in high and 2.9 mph in low, forward and reverse. Engine and other working parts are accessible for maintenance. To permit all-weather operation, clearance has been provided for tire chains on drive wheels. Another new model is available in 2000-lb capacity size.

Roofing and Siding: Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19—Aluminum roofing and siding material for industrial use is designed to carry heavy loads and meet building code requirements. The industrial roofing was designed for use on open-framed buildings and supplements the company's roofing sheet which has been used on farm buildings. It is said to have high strength and resistance to industrial atmospheres with minimum maintenance and reduced roof load. The material has a covering width of 32 in. and comes in 5-ft through 12-ft lengths. All necessary fittings and accessories such as ridge roll, flashings, rivets, nails, straps, etc., is supplied with roofing and siding.

Abrasive Points: Norton Co., 1 New Bond St., Worcester 8, Mass.—Kit of vitrified bonded abrasive points mounted on steel spindles is made up of one each of the 16 most popular sizes and shapes. They are packed in a sturdy shipping container which serves



as a handy holder on the bench while the points are in use. Each point has its own location in the box, stamped with the number of the point.

Band Saws: DoALL Co., 254 North Laurel Ave., Des Plaines, Ill.—— Band saws have throat depth of 16 in., work thickness capacity of 12⅛ in., table size 20 x 20 in. with 45-degree tilt right and 5 degrees left. Balanced cast aluminum saw blade wheels will accommodate blades from 1/16 to 5/8-in. Frames are arc-welded from die-formed plates and are braced. Model HS-4 offers four speeds—2000, 3000, 4000 and 5000 fpm through a four-step cone pulley. Model LHV features a high and low variable speed range (100 to 300 fpm and 1700 to 5100 fpm) achieved through

a transmission and variable drive. Power choice is ½ or ¾-hp. A new contour attachment as well as standard attachments are available.

Compressor Crankshaft:

Davey Compressor Co., North Water St., Kent, O.—New type crankshaft is said to eliminate air compressor vibration and rocking motion by spreading compressor

(*Concluded on page 242*)

YOU MAY NOT REQUIRE . . . . .

. . an Age Hardening Oven—*OR DO YOU?*

• • • •

BUT **LANLY**

ACCOMPLISHMENTS IN THIS UNUSUAL

BOEING OVEN

DEMONSTRATE THE EXPERIENCE AND ABILITY

REQUISITE TO BUILD *FINE FOUNDRY OVENS*

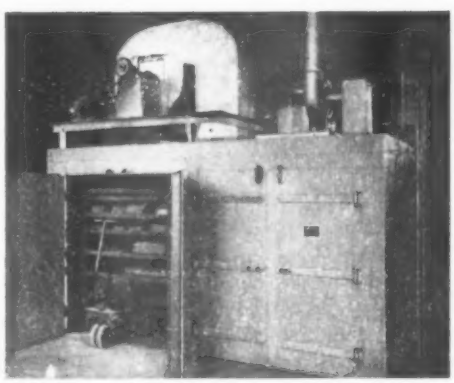
If you need a foundry oven of *conventional design,* LANLY has a time proven unit in their extensive line.

If you have an *unusual problem* or require an oven for vast volume production, LANLY engineers have the experience to design and build a unit that will exactly meet all specifications.

Although not a foundry unit, the performance of this age hardening oven for Boeing Aircraft Co. again demonstrates this LANLY ability.

Size inside 45 x 12 x 8 feet. Usable as a single unit or two compartments with different temperatures in each. Heated electrically. Temperature raised to 500° F. in one hour and held to plus or minus 3°. Instant push-button temperature indication in 12 zones. Material moved on 20-foot cars which can be coupled to handle large pieces. 5-inch fibre glass panel insulation.

You Can Contact LANLY regarding conventional or special ovens with justified confidence.



THE LANLY CO.

OVENS FOR INDUSTRY

HEATED BY GAS, OIL, ELECTRICITY OR STEAM

750 PROSPECT AVENUE · CLEVELAND, OHIO

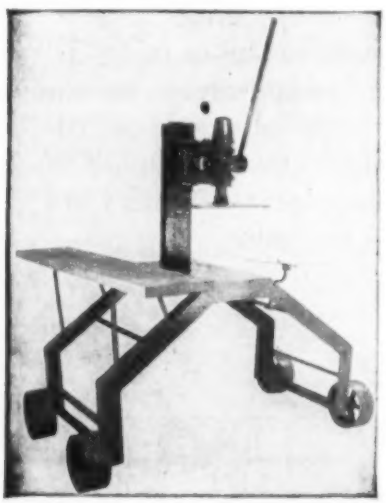
Write for LANLY Literature or specifically describe your particular requirements in Foundry Ovens

"RAPID" MOLDING MACHINES

★

PORTABLE JOLT SQUEEZER R9X

WRITE for NEW BULLETIN "F"



PORTABLE JOLT SQUEEZER R-10

PIONEER MANUFACTURING CO.

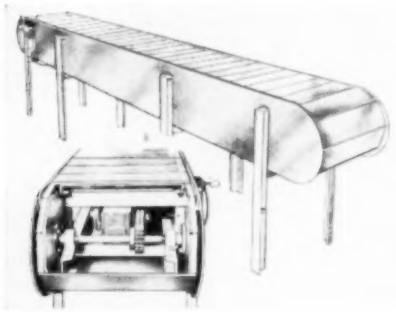
Molding Machine Manufacturer for Over 20 years

MILWAUKEE (West Allis) WISC.

(*Concluded from page 240*)

working strokes evenly over the 360 degrees of crankshaft rotation. Used on compressors made by the company, the crankshaft permits higher compressor operating speeds and increases compressor life as much as 50 per cent, it is claimed.

Belt Conveyor: Patron Transmission Co., 129 Grand St., Dept. 89, New York 13—Prefabricated, all-aluminum, belt conveyor comes in 5-ft sections which may be assembled in one continuous unit up to 150 ft. Speeds are



up to 100 fpm, load capacity 250 psf and pulling load 6100 lb. Maximum temperature limit is 500 F. Standard equipment includes speed reducer, drive, pillow blocks, take-ups, shafts and electric reversible control. Conveyor is available in widths from 6 to 60 in. and heights from 15 in. up.

Arc Welders: Hobart Brothers Co., Box 13, Troy, O.—Industrial type ac transformer welders have a large illuminated current indicating scale uniformly calibrated from minimum to maximum welding heat settings. The units are said to have a high full-load efficiency and a low no-load input. They are of the moving coil type (both primary and secondary coils move when adjustment is made) with no adjustable magnetic paths. Welders are offered in 300 and 500 amp sizes for operation on single phase, 60 cycle current, 220/440 or 550 v. They can be furnished for 50 cycles also.

Skid Boxes: Phillips Mine & Mill Supply Co., 2227 Jane St., Pittsburgh 3—Open tier skid and tier boxes are designed for hauling or storing industrial materials and can be used with platform or fork lift trucks. Skid is an open unit which provides easy access to materials when skids are stacked; the box is for materials which will not stack neatly. Both units can be stacked separately or interchangeably. The new units have cupped feet designed for maximum floor protection and to facilitate stacking. Decks are of double corrugated steel plate with plate channels at right angles to each other. Units are furnished to required dimensions.

Hot Air Generator: Todd Shipyards Corp., Combustion Equipment Division, 81-16 45th Ave., Elmhurst, Queens, L. I., N. Y.—Machine producing hot air of controllable velocity, temperature, quantity and pressure and used for drying ship's motors and engineroom machinery is said to have application in the foundry for preheating, annealing and cooling (by shutting off the heat and using only the blower.) Two sizes are available, both developing air at 350 F; one with a capacity of 100 cfm and the other 10,000 cfm.

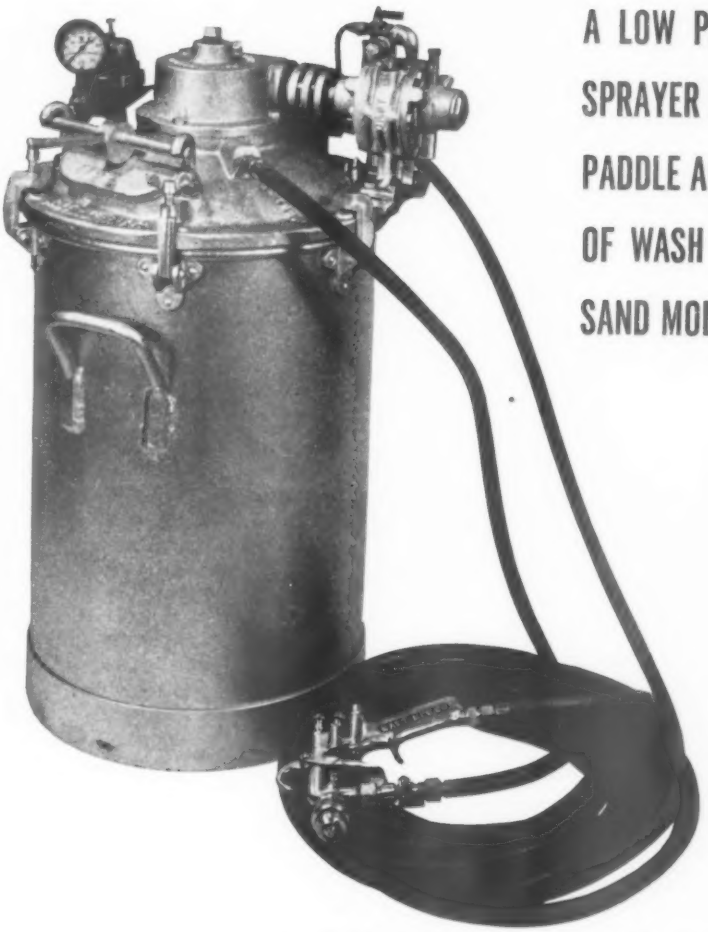
Electrode: General Electric Co., Electric Welding Division, Schenectady 5, New York — Electrode for welding cast iron where the weld must be machineable is composed of pure nickel core wire and an extruded black covering which is largely consumed in the arc and said to produce little slag. The rod may be used in all welding positions on ac or dc (reverse polarity).

Furnace: Johnson Gas Appliance Co., 520 "E" Ave., N. W., Cedar Rapids, Iowa—Metal melting furnace is designed for melting lead, tin, zinc, pot metal, type metal, aluminum, etc. It is equipped with nine burners with separate valves and pilot lights, has capacity of 1000 lb of lead and delivers pot temperatures up to 1400 F. Furnace can

be furnished with automatic temperature controls. Removable cast iron pot with lifting hooks is standard equipment.

Aluminum Paint: Prufcoat Laboratories Inc., 63 Main St., Cambridge 42, Mass.—Ready mixed aluminum paint is available for all general maintenance painting. Synthetic resin vehicle is acid, alkali and water-proof. Pigment is leafed aluminum particles.

GAST CORE & MOLD SPRAYER



A LOW PRESSURE, LARGE JET ATOMIZING SPRAYER WITH AIR MOTOR, GEAR DRIVEN, PADDLE AGITATOR FOR APPLYING ANY TYPE OF WASH TO EITHER GREEN SAND OR DRY SAND MOLDS OR CORES. 10 GAL. CAPACITY.

Particularly adapted to silica, naphtha or gasoline, talc and synthetic washes as well as the graphite and coke base materials. Wash is kept in suspension by paddle agitator when sprayer is in use. Write for descriptive literature.

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WHAT IT WILL DO

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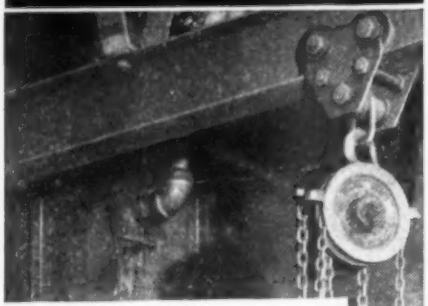

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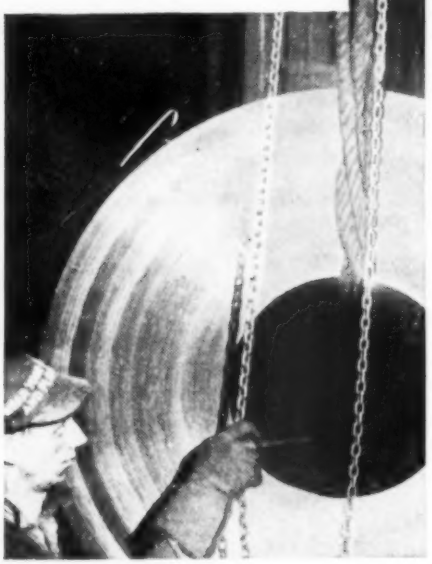

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...TRADE PUBLICATIONS...

MATERIAL HANDLING: Clark Tructractor, Div., Clark Equipment Co., 258 West Champion St., Battle Creek, Mich. — "Material Handling News" presents case studies of truck and tractor installations, discussions of material handling problems and new ideas and mechanical developments in material handling machinery.

OXYGEN EQUIPMENT: Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8—Bulletin deals with the company's respirators and auxiliary parts and equipment. An oxygen therapy unit for administration of oxygen by plant physicians in dispensaries, hospitals, or on emergency calls is described in another bulletin.

WELDING ACCESSORIES: Tweco Products Co., P.O. Box 666, Wichita 1, Kans.—Catalog describes company's line of cable connections for electric welding. These include all tools and fittings required on a cable, both electrode and ground, to mechanically hold and electrically transmit welding energy from welding machine to point of deposition.

PYROMETER: Pyrometer Instrument Co., 106 Lafayette St., New York 13—Catalog 160 describes a new surface pyrometer—an all-purpose instrument with interchangeable extension arms and thermocouples, making the instrument suitable for temperature measurements on metallic or nonmetallic surfaces.

MOTOR PROTECTION: Electric Machinery Mfg. Co., 1331 Tyler St. N. E., Minneapolis 13—Booklet, illustrated with diagrams and photographs, defines protective arrangements for electric motors. A section is devoted to explaining how to figure voltage drop, particularly in motor starting.

CRANE WHEELS: Downs Crane & Hoist Co., 540 West Vernon Ave., Los Angeles 37—Bulletin 3540 describes design features, industrial applications and gives other pertinent information on crane wheels and wheel assemblies. Booklet includes illustrations, engineering drawings and specifications.

FURNACES: Gas Machinery Co., 16120 Waterloo Rd., Cleveland 10—Gas-fired high temperature furnaces for all types of heat treatment are described in folder. These furnaces achieve controlled atmospheres with temperatures up to 2500 F using new type radiant heating tubes.

FOUNDRY PRACTICE: Foundry Services Inc., 280 Madison Ave., New York 16—Bulletin entitled "Foundry Practice" contains practical discussions of various foundry subjects, including core blowing, iron foundry practice, and production of die and permanent casting molds.

DRIER/COOLER: Link-Belt Co., Drier Division, 300 West Pershing Rd., Chicago 9—Booklet 2209 provides information on a new drier/cooler for materials requiring short treatment time and/or multiple drying temperatures. It is possible to dry, cool and process materials in the same unit. Air for drying can be heated by steam coils or by gas, oil or coal-fired furnaces. Booklet contains installation views, typical layouts, and dimensions of ten standard sizes of drier units now available.

ACETYLENE GENERATOR: Air Reduction Sales Co., Dept. F-6786, 60 East 42nd St., New York 17—Catalog lists and explains a complete line of acetylene generators. Stationary models covered are the 300 lb single and double rated and the 500 lb double rated. Portable models range in size from 15 to 50 lb. Oxygen and acetylene manifolds are described also. Diagrams showing typical manifold installations are included and a section is devoted to gas control and safety devices for pipe lines.

ABRASIVE WHEELS: Chas. H. Besley & Co., 118 North Clinton St., Chicago 6—48-page pocket-size handbook for industrial users of abrasive wheels describes the company's grinding discs, includes price list tables and provides information on the types of grain used in making the wheels, porosity control and types and uses of coolants. Another section contains photographs and descriptions of wet and dry grinders and a piston ring finishing machine.

PLASTIC PAINT: Wailes Dove-Hermiston Corp., 449 South Ave. East, Westfield, N. J.—Four-page pamphlet gives details of and uses for a new plastic protective coating that waterproofs and vapor seals metal, masonry or concrete surfaces. Information is also provided regarding its quick drying, fire retardance, ability to withstand temperature extremes and applicability with brush or spray.

MARKING TOOLS: M. E. Cunningham Co., 97 East Carson St., Pittsburgh 19—Bulletin J-547 features marking and stamping tools for many industrial marking purposes. Tools are made of a special alloy steel which is said to eliminate mushrooming and spalling of tools, minimizing accidents caused by flying chips of steel.

WIRE CLOTH: Buffalo Wire Works Co., 425 Terrace, Buffalo 2—Folder 596 contains information on stainless steel wire cloth. Included are two pages of laboratory ratings on corrosion resistance, data on properties, table of mesh sizes and actual size photographic illustrations of each standard mesh.

LUBRICATOR: Farval Corp., 3293 East 80th St., Cleveland 4—Folder, "Studies in Centralized Lubrication," gives representative case histories of centralized lubricating systems installed on industrial equipment.

CORROSION - RESISTANT MATERIALS: U. S. Stoneware Co., P. O. Box 350, Akron 9, O.—Bulletin K describes a line of corrosion-resistant materials and

(*Concluded on page* 246)

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equipment including tubing, gasketing, lining materials, protective coatings, pipe and fittings, laboratory sinks, jars, pots, tanks, suction filters, valves, centrifugal acid pumps, mixing equipment, towers and tower packing, and masonry.

ALLOYS: Murex Ltd., Rainham, Essex, England—Various booklets deal with the following subjects: Molybdenum—effect of molybdenum additions to cast iron including that on tensile and transverse strengths, hardness, resistance to abrasion and mass. Products — lists various metallurgical and chemical products made by the firm including ferroalloys, pure metals, bearing metal, nonferrous alloys, metal and alloy powders, etc. Bearing Metal — covers properties, handling and applications of company's nickel-hardened antifriction metal. Powder Metals — lists kinds made by the firm. Analyses—presents analyses of salts, oxides and acids of molybdenum, tungsten and vanadium produced by the company.

GRINDING-POLISHING: Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6—Booklet describes company's method which is claimed to reduce grinding and finishing time from 30 to 80 per cent. Information and pictures of equipment which may be adapted to this method and a description of the company's service available to those desiring help on grinding problems are included.

DOCKBOARDS: Magnesium Co. of America, 1 North La Salle St., Chicago 2—Leaflet describes magnesium dockboards which are of typical bridge design and light enough to permit handling of most sizes by one man. Data sheet is included showing information the company needs to design dockboards for any specific operation. Illustrations of typical applications are shown.

AIR FILTERS: American Air Filter Co., 266 Central Ave., Louisville 8—Bulletin 210 deals with the application of replaceable type air filters for ventilating and air conditioning systems. Descriptions and illustrations of each type filter are given, along with instructions for maintenance and detailed engineering and installation data.

HAND TRUCKS: Rapids-Standard Co. Inc., Dept. WE-145, 342 Peoples National Bank Bldg., Grand Rapids 2, Mich.—Bulletin WE-24P contains photographs of single and double-handled models of the truck. Also shown is a "step climber" feature. Specifications list five different types of wheels available for the trucks.

CRANE: Hyster Co., 1802 North Adams St., Peoria 1, Ill.—Specifications and a picture study of typical applications of the company's lifting and carrying crane are contained in an illustrated booklet. Information is also given on a line of fork lift trucks.

ALLOY GUIDE: Birmingham Aluminium Casting (1903) Co. Ltd., Birmid Works, Dartmouth Rd., Smethwick, 40, England—Data booklet is a guide to the selection of suitable casting alloys in aluminum, magnesium and zinc. Descriptions of characteristics and specifications of various alloys for different casting methods as well as illustrations of typical castings are included in the book.

FINISHING SYSTEMS: Peters-Dalton Inc., 17900 Ryan Rd., Detroit 12—Technical bulletin 501 available by letterhead request outlines some of the basic points to be considered in the planning of a complete organic finishing system. Entitled "Planned Systems" the bulletin contains illustrations of complete paint finishing installations including metal preparation, washers, paint spray booths and drying and baking ovens.

WASHFOUNTAINS: Bradley Washfountain Co., North 22nd & West Michigan Sts., Milwaukee 1—Catalog 4701 presents the company's line of washfountains, multistall showers and drinking fountains. Specification data and washroom planning suggestions are included, and advantages of improved sanitation with reductions in maintenance and installation costs are explained.

CENTRIFUGAL PUMPS: Allis-Chalmers Mfg. Co., P. O. Box 512, Milwaukee 1—Bulletin 52B6691 describes construction features and operation data of company's line of pedestal type centrifugal pumps. Table for correct selection of pump size, motor operating speed and belt drive to give capacity desired is included.

WELDING ACCESSORIES: Metal & Thermit Corp., 120 Broadway, New York 5—Bulletin describes company's line of welding accessories including welding cable, cable connectors, lugs and splicers, cleaning tools, cover plates, eye and hand shields, ground clamps, hammers, helmets, holders, lenses, protective clothing and spectacles.

FIRE EXTINGUISHERS: Pyrene Mfg. Co., 560 Belmont Ave., Newark 8, N. J.—Circular describes company's cartridge-operated 2½-gal water-type and antifreeze fire extinguishers. These extinguishers are said to be easily maintained by simple examination and by weighing the gas cartridge..

RESURFACING MATERIAL: Stonhard Co., 403 North Broad St., Philadelphia 8—Handbook, "Over the Rough Spots," is designed as a guide for the construction and maintenance of floors, walls, foundations, roofs, etc., in industrial buildings.

STEEL GEARS: Racine Steel Castings Co., Division of Belle City Malleable Iron Co., 1442 Forest St., Racine, Wis.—Illustrated folder 4 contains a description of the production and applications of cast tooth steel gears and sprockets used principally in field equipment.

TRAILERS: Service Caster & Truck Corp., 691 North Brownswood Ave., Albion, Mich.—Booklet, "Trailers by Service," describes the company's line of industrial trailers, dump trucks and special purpose trailers.

VALVES AND FITTINGS: Alloy Steel Products Co., 1300 West Elizabeth St., Linden, N. J.—Catalog 47 contains construction details, specifications and general information on the company's line of stainless steel valves and fittings.

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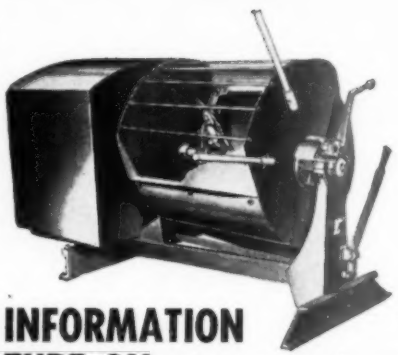

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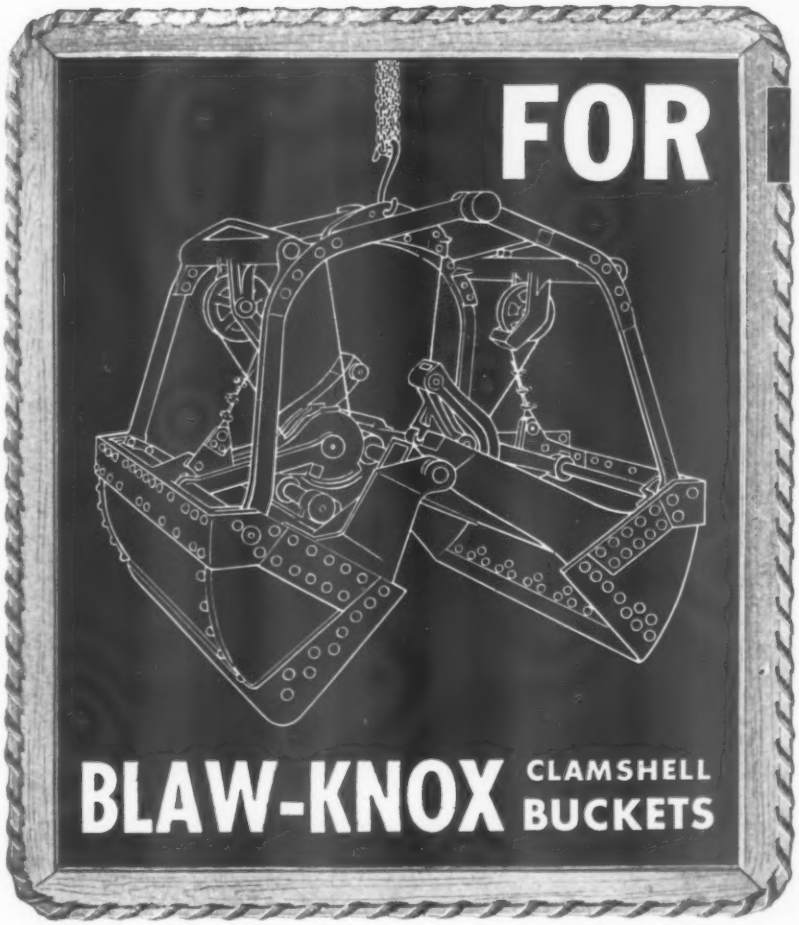

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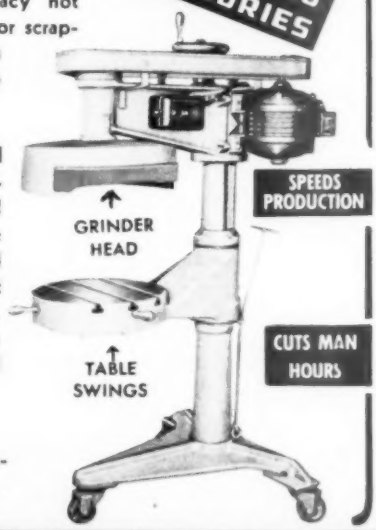

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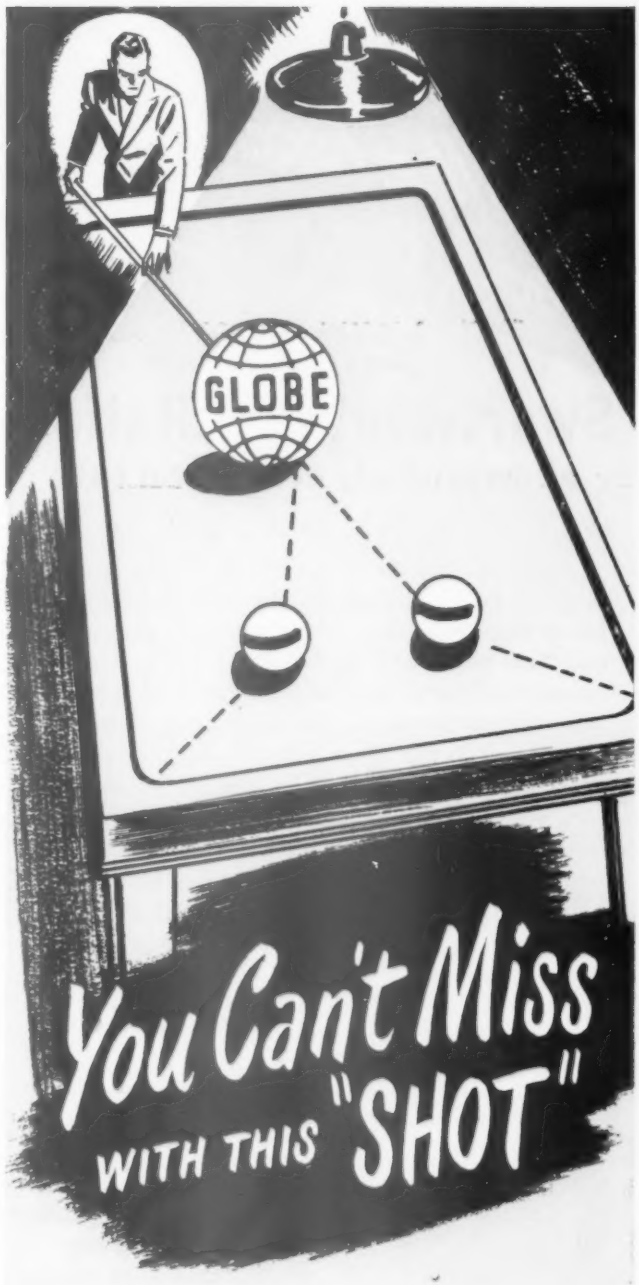

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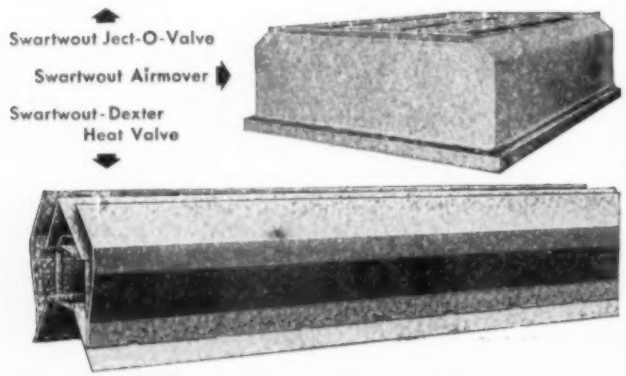

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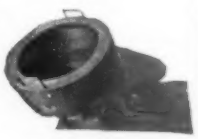
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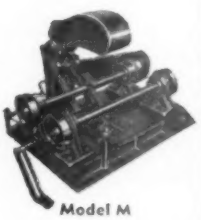
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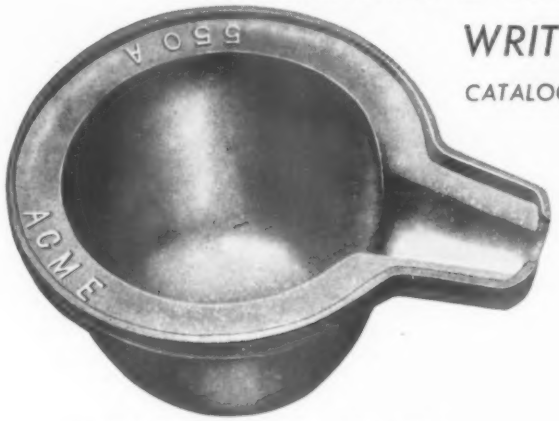
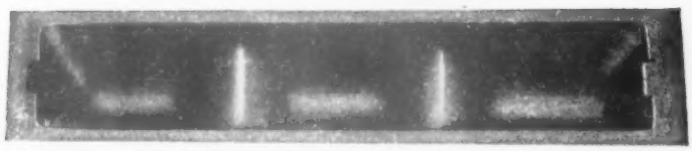


ROUND SPOUT POT NO. 550A
WITH 1½" COLLAR ON FLANGE

HOLDING ——→
BOWL NO. HP7001



INGOT MOLD NO. AA-6

Made of Acme SPECIAL-M-Heat Resisting Iron — They Stand the Heat!

ACME FOUNDRY COMPANY

DETROIT 16, MICHIGAN

2502 TWENTY-SECOND ST. PHONE TASHMOO 5-2404

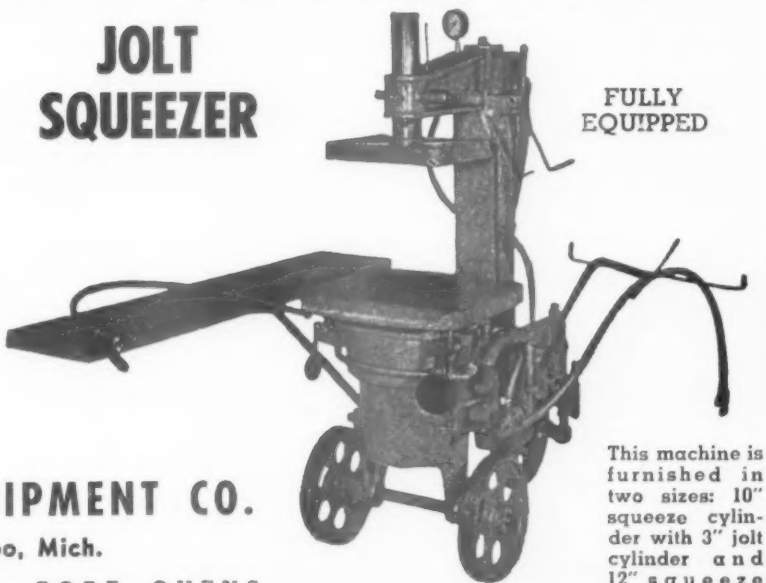
HAYNES EQUIPMENT

JOLT SQUEEZER

FULLY EQUIPPED

● The post and squeeze cylinder on the HAYNES JOLT SQUEEZER is cast all in one piece. There are no bolts or screws in this machine. The top of the post is machined on top with a 2 7/16" cold rolled shaft which the swing arm swings on.

This is a portable machine with three wheels, two in front, one in back, zerk fittings on all moving parts. Comes equipped with air gauge, pop-off gauge and a pin on top of the arm for a gate horn.



This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

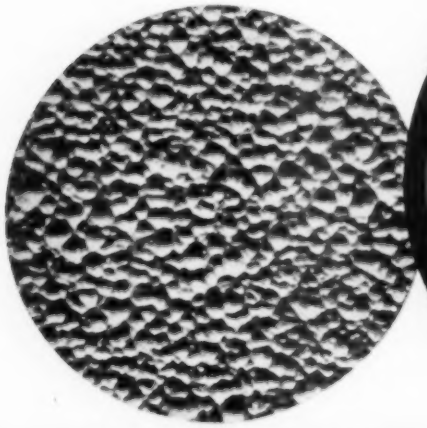
HAYNES FOUNDRY EQUIPMENT CO.

814 Ada Street—Kalamazoo, Mich.

LADLES—BRASS FURNACES—CORE OVENS

CLEAN work

BECAUSE EVERY GRAIN IS A COMPLETE CUTTING TOOL



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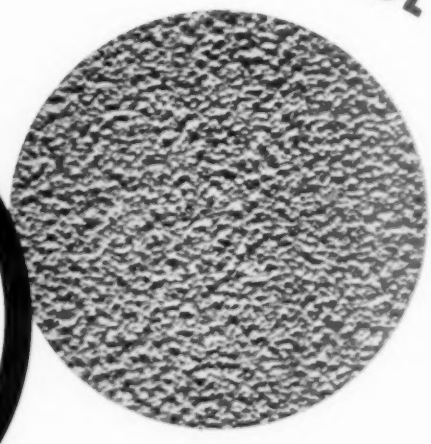

Pittsburgh Crushed Steel Co.
PITTSBURGH, PENNA.
Steel Shot and Grit Co.
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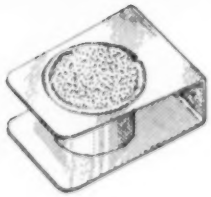
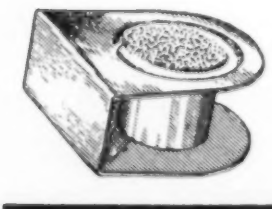
CHAPLETS





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Widely used to core holes through ribs and lugs which extend into the mold perpendicular to the parting line, the hinge tube assures clean holes, accurate for size and location. We have pioneered a wide range of types and sizes.

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NO. 4 DAYTON RING VALVE BENCH RAMMER

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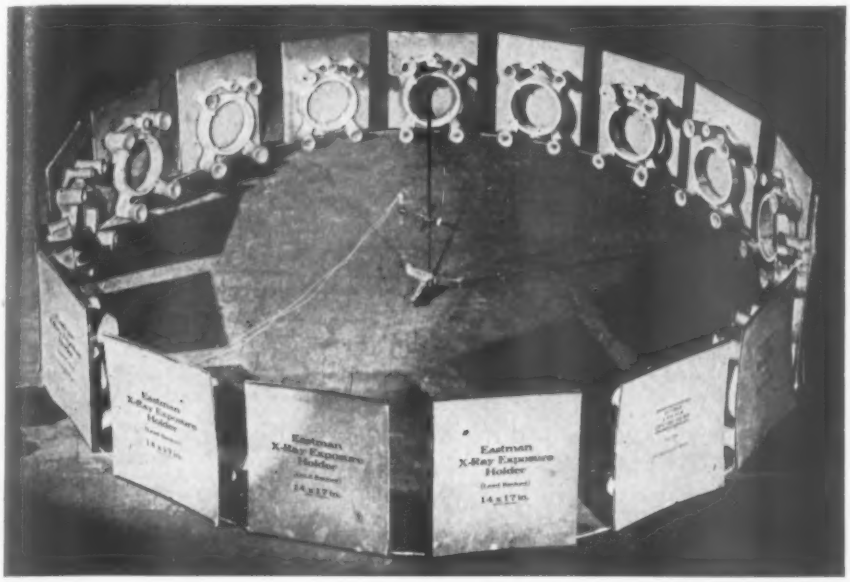

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Write us concerning any problem of Gamma Ray Radiography

"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicate the best method of casting with a minimum of defects in the casting itself.

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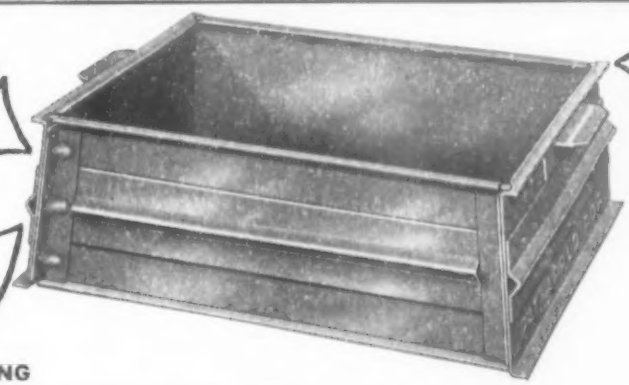
FOR DEPENDABILITY IN FOUNDRY PRODUCTION . . .

The UNITED Steel JACKET



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EXTRA STRENGTH

Sturdy Channel Construction
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Cooling Vent
ELIMINATES WARPING

United steel jackets are designed and manufactured exclusively for foundrymen who demand a superior product for high production work . . . Unique channel construction assures extra strength and durability . . . New self-cooling double reinforcement at the parting line eliminates warping on runouts . . . All parts are electrically spot welded with additional arc welds at strategic points.

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Moline

MOLDING MACHINES

FAST PRODUCTION
BETTER CASTINGS
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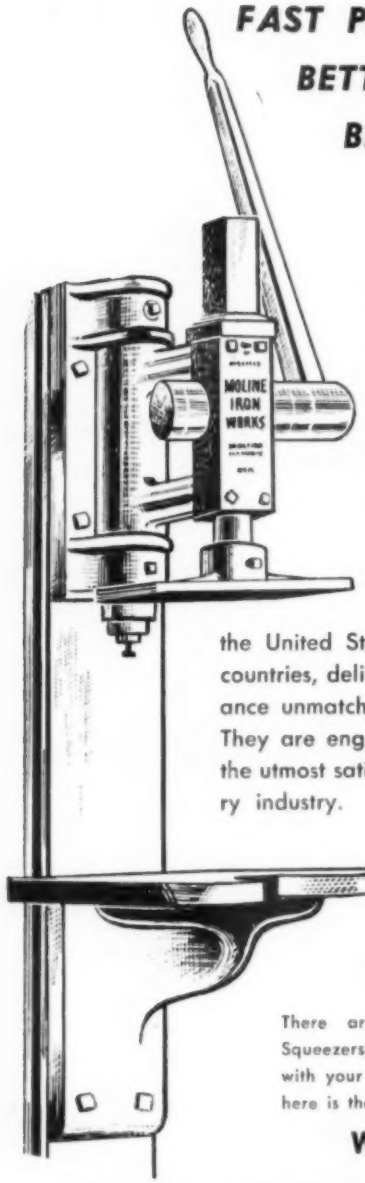

Moline Squeezers have a reputation for getting things done faster and better, and at lower cost. That is why they are being used in all types of foundries from coast to coast in batteries of from half a dozen machines to one hundred and sixty six. They are doing a big job in foundries all over the United States and in nine foreign countries, delivering a level of performance unmatched by similar equipment. They are engineered and built to give the utmost satisfaction to the vast foundry industry.

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MOLDS ARE BLACKENED FASTER
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WORK COMES CLEANER
Satisfactory Performance Guaranteed or Money Back!

PRICES COMPLETE WITH SUCTION HOSE AND SINKER

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PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

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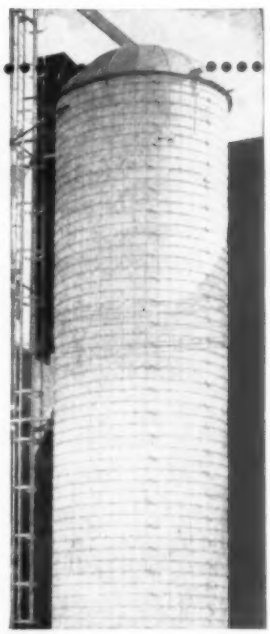
VERTICAL STORAGE
SAVES GROUND SPACE



Where ground is limited, valuable space can be saved by storing flowable bulk materials in Neff & Fry super-concrete stave silos. What's more, conveying distances are shortened, which reduces the cost of labor and equipment.

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NEFF & FRY STORAGE BINS

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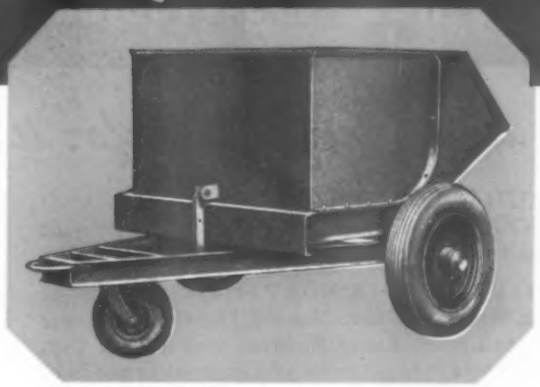

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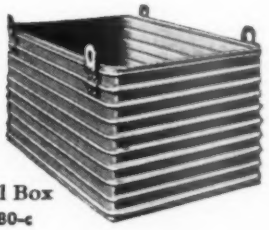
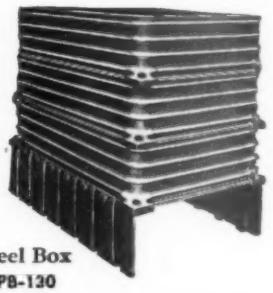


Steel Box
B-80-c



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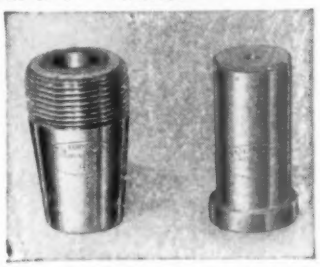
Saves AIR

Saves SHOT, GRIT SAND



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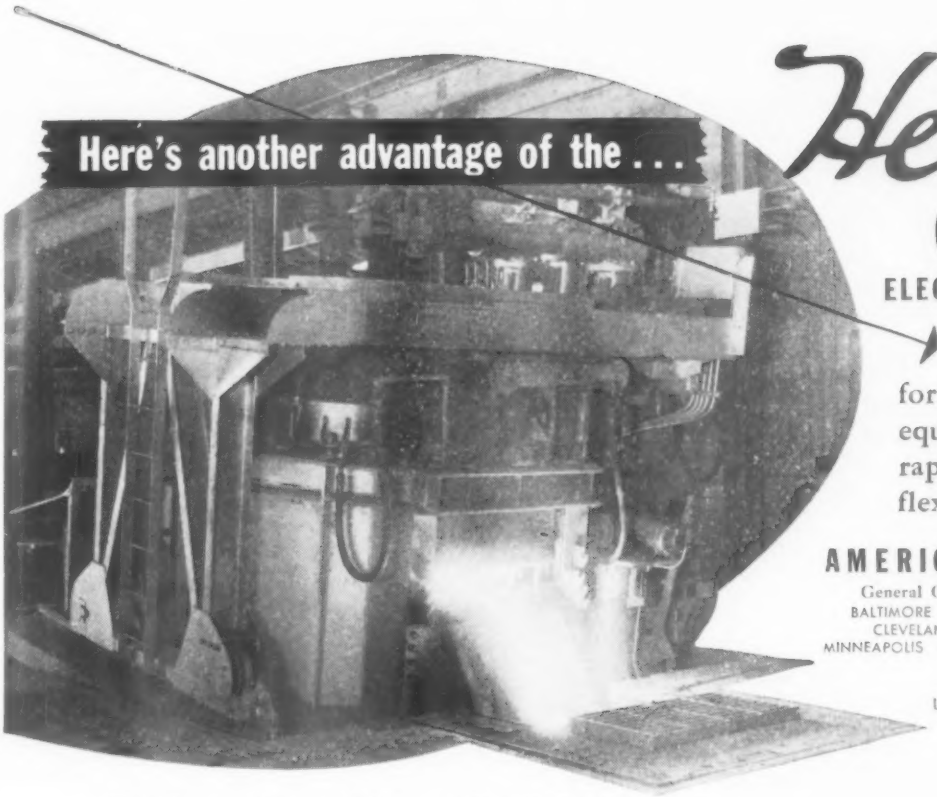

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UNITED STATES STEEL

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The Favorite Blades of Non-Ferrous Foundries for Over 20 Years

You will profit by using the tougher Atlantic blades for clean, speedy cutting of gates and risers from castings. You can eliminate unnecessary grinding operations—our specially milled tooth construction makes it easier to cut closer to the body of the casting. All Atlantic Metal Cutting Band Saws are guaranteed as to material, workmanship and temper.

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Exclusively Band Saw Production

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MIDWEST FOUNDRY SAYS: *"we recommend the Buda Chore Boy highly for all foundry use . . ."*

IN a recent letter, this typical foundry states, in part . . .

"We have had one of your trucks in operation in our plant for over a year and its services are very satisfactory. We recommend this Buda truck (Chore Boy) highly, for all foundry use."

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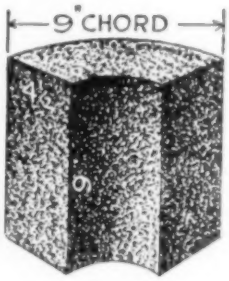
1-ton capacity Chore Boy referred to in the accompanying letter. Note spacious dump hopper.



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Dimensions of all Blocks

Outside Chord . . . . . 9"
Radial Dimension . . . . . 4½"
Height . . . . . 9"

Name of Block	Inside Chord in Inches	Diameter in Inches		Number of Blocks to Circle
		Inside	Outside	
A	5¾	16	25	9
B	6⅛	21	30	11
C	6⅜	27	36	13
D	6⅝	30	39	14
E	7⅛	40	49	18
F	7⅜	51	60	21
G	7⅝	60	69	24
H	8	73	82	29

Cupola blocks all sizes 9" series and special shape refractories.
Milled fire clay and special cements.

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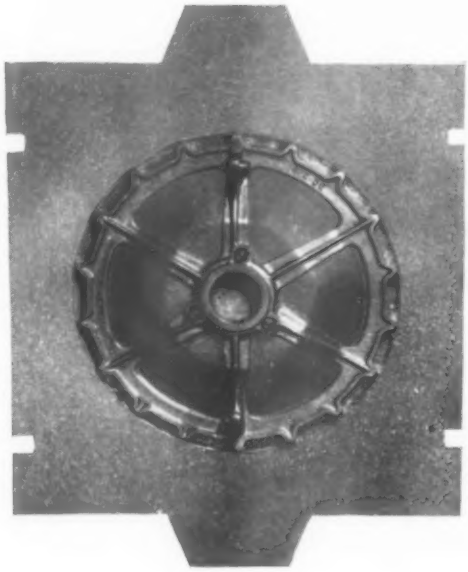
GLOBE IRON CO JACKSON, O.



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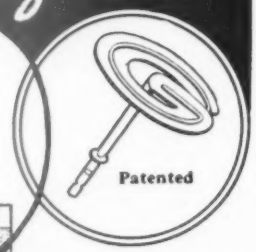
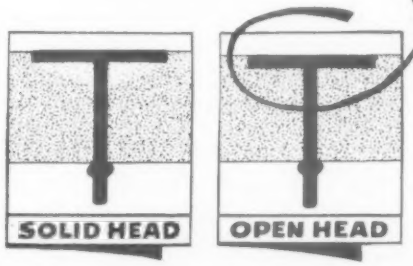
The Open Head Chaplet PERMITS MORE SOLID PACKING of SAND

More solid packing of sand means that cores are supported more firmly, thereby reducing casting rejects and make-overs. Quality, too, is an important feature of Cleveland Chaplets.





We also make Square Head Chaplets, Stem and Double-Head types for heavier work.

CLEVELAND CHAPLET & MFG. CO.

West 67th St. & N.Y.C. Ry.
CLEVELAND O.

CLEVELAND Since 1890 Chaplets

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USED IN GOOD FOUNDRY PRACTICE FOR 38 YEARS

BINDARENE IPCO CORE BINDER

AN ORGANIC BINDER FOR FOUNDRY CORES, FACINGS AND SPRAYS

INTERNATIONAL PAPER COMPANY
BINDARENE SALES DEPARTMENT
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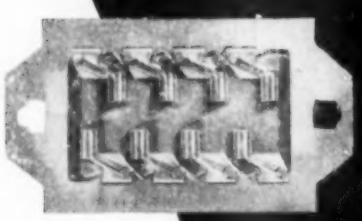
ALUMINUM MATCHPLATES

Get casting accuracy and stepped up production with Acme matchplates, core boxes, cope and drag plates. Single or multiple sections from one master pattern. Precision cast. Low clean-up time. Prompt delivery. "*Quotations Furnished.*"

Our 17th year as matchplate and core box specialists. Modern aluminum, brass, and bronze foundry. For a combination of accuracy, economy, and service, send specifications and prints to Acme.



★ MATCHPLATES
★ CORE BOXES
★ COPE AND DRAG PLATES
★ PRECISION CASTINGS

ACME ALUMINUM ALLOYS INC.
DAYTON 3, OHIO

"OLIVER"
Single Surface Planer

Takes stock up to 24" wide 8" thick

A compact efficient Planer for your pattern shop

This sturdy, precision-built Planer is a favorite in many pattern shops. It feeds at any rate from 18' to 40' a minute at the turn of a dial. Controls centrally located for operator's convenience. Revolving parts enclosed for safety and exclusion of dirt. *Ask for Bulletin 299.*

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

HELPFUL LITERATURE

NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card.

1. Grinding Wheels

Norton Co.—32-page illustrated bulletin form No. 1405-3P presents data on line of grinding wheels for use in foundries, steel mills and forging and welding plants. Both B-5 and B-7 resinoid bonds are discussed. Suggested specifications for foundry grinding are included.

2. Graphite Electrodes

International Graphite & Electrode Corp.—160-page vest-pocket size booklet entitled "Graphite Electrodes for Electrothermic and Electrolytic Purposes" describes method of manufacturer, nature and properties of graphite electrodes. Tables of standard sizes, weights and tolerances are given together with such other data as electric furnace and electrolytic cell operation.

3. Reverberatory Furnaces

Stroman Furnace & Engineering Co.—8-page illustrated bulletin No. 150 describes Sklenar reverberatory furnaces for melting brass, copper, nickel-copper, gray iron, aluminum and other alloys of ferrous or nonferrous nature. Furnaces can be either oil or gas fired.

4. Aluminum Alloys

National Smelting Co.—8-page illustrated catalog "Allcast Alloy SC8" describes Allcast high quality general purpose aluminum alloy which has nominal composition of copper and silicon and is recommended for variety of casting requirements.

5. Industrial Truck Attachment

Towmotor Corp.—Illustrated leaflet on Upender truck attachment describes unit which is designed for picking up small or large heavy rolls of paper, whether they are in horizontal or vertical position. It facilitates carrying and stacking of rolls in whatever position desired.

6. Foundry Equipment

Baker Perkins Inc.—4-page illustrated bulletin briefly describes core sand mixers, flow controls, heat treating and core ovens, continuous mullers and sand scales for use in foundries.

7. Flask Bushings & Pins

Universal Engineering Co.—7-page illustrated loose-leaf type catalog No. F1003 and price list covers line of Universal standardized flask bushings and pins for use in cast iron, steel or aluminum flasks. Dimensional data on all sizes and types are included.

8. Crane Wheels & Assemblies

Downs Crane & Hoist Co.—12-page illustrated bulletin No. 3540 outlines design features, industrial applications and other pertinent information on lines of crane wheels and wheel assemblies of types MCB, pin and keeper, cartridge bearing, direct drive and single flange.

9. Muller Type Mixers

Clearfield Machine Co.—36-page illustrated catalog No. 79 describes line of muller type mixers for conditioning foundry sand and other materials. Principles involved in proper preparation of foundry sand are discussed and advantages of revolving pan type mixers are described. Line includes sizes for handling from 4 to 14 cubic feet of sand per charge.

10. Metal Melting Furnaces

Lees Hall & Sons, Ltd.—Illustrated broadside "L.H. & S. Furnaces For All Metal Melting" includes descriptions and illustrations on coke fired tilting, twin type tinning and white metalling furnaces; cupolas; rotary type, standard lift-out and pot hole furnaces; and foundry accessories.

11. Permanent Magnets

Homer Mfg. Co.—6-page illustrated folder "For Positive Removal of Tramp Iron and Steel in Processing . . ." features permanent magnets of various shapes and sizes for application in conveyors, chutes or air lines in textile, plastic, food and paper mill industries.

12. Abrasive Products

Sterling Grinding Wheel Div.—40-page illustrated brochure presents pictorial trip through departments of plant in which wide range of abrasive wheels, abrasive disks and abrasive points are fabricated. History of company and features of line of products are related. Typical products are described.

13. Motor Control

Allen-Bradley Co.—36-page illustrated booklet entitled "Quality Motor Control", First Edition, describes complete line of alternating and direct current controls and presents specifications and dimensions data as well as prices. Tables show proper method of selecting correct heater elements for various applications and full load ampere ratings of alternating and direct current motors.

14. Cranes & Hoists

Conco Engineering Works—8-page illustrated bulletin No. 3000 describes several types of manual and power operated overhead traveling cranes, jib cranes, chain and electric hoists and I-beam trolleys for use in foundries. Specification data and features are covered.

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15. Flexible Metal Hose

Chicago Metal Hose Corp.—68-page illustrated catalog No. G-47 explains Flexonics which is defined as controlled bending of thin metals for use under varying conditions of temperature, pressure, vibration and corrosion. Rex-Weld corrugated hose, Rex-Tube convoluted tubing, Rex-Flex stainless steel hose and fittings are described.

16. Conveyors

Trowbridge Conveyor Co.—8-page illustrated catalog No. 755 presents information on standard line of portable flat belt conveyors for coal, coke and other abrasive materials; and portable trough belt conveyors for handling sand, gravel and cinders. General freight portable conveyors and special units are described.

17. Dust Collectors

Torit Mfg. Co.—24-page illustrated catalog No. 31 covers line of dust collectors which are self-contained units for removing dust laden air around grinding, cutting and polishing wheels. Accessories are described.

18. Industrial Trucks

Clark Tructractor Div., Clark Equipment Co.—36-page catalog "Above Everything Else" presents information on complete line of material handling machines, both gas and battery powered. In addition to specifications of familiar models of fork lift trucks, catalog covers Yardlift series of pneumatic-tired fork trucks and Pul-Pac attachment which handles loads without pallets.

19. Presses & Cranes

Cleveland Crane & Engineering Co.—8-page illustrated publication Vol. 4, No. 4, cites specific installations and operations of Steelweld presses, overhead cranes and tramrail systems in numerous types of metalworking plants.

20. Metal Baler

Dempster Brothers, Inc.—8-page illustrated folder No. 7008 reveals specifications and working efficiencies of models 125 and 275 Dempster Balester scrap metal baling units capable of turning out 1 and 3 tons of bales per hour respectively.

21. Continuous Sand Mixer

Kent Machine Co.—6-page illustrated folder describes Kent continuous mixer for delivering properly proportioned sand in steady stream. Two models with capacities of 5 and 8 cubic yards per hour are described.

22. Flexible Couplings

Ajax Flexible Coupling Co.—24-page illustrated catalog No. 44 presents data on principle of operation, parts, horsepower ratings, service factors and types of Ajax flexible couplings for wide range of foundry applications.

23. Metal Cutting Saw

Machine Tool Div., Kalamazoo Tank & Silo Co.—8-page illustrated catalog No. 46 describes and gives specifications of Kalamazoo metal cutting band saw. Cutting action is continuous and unit has built-in off-the-floor coolant system. Wet and dry cutting speeds are charted.

24. Sulphur Carbon Analyzer

Harry W. Dietert Co.—Illustrated data sheet deals with device for determining carbon and sulphur content of metals, fuels and chemicals. Carbon content of iron and steel can be determined in 2 minutes. Accuracy is within 0.2 per cent.

25. Steel Strapping Tool

A. J. Gerrard & Co.—4-page illustrated folder "Steelbinder" describes Steelbinder tool which binds any size or shape object for safe shipment and for indoor or outdoor storage. It applies strap from ⅜ to ¾-inch wide in any thickness up to 0.028-inch without adjustment.

26. Self-Dumping Hoppers

Roura Iron Works—4-page illustrated folder includes construction and engineering data on self-dumping hoppers for wide range of foundry applications. Operational information and adaptability are outlined.

27. Surface Pyrometer

Pyrometer Instrument Co.—4-page illustrated catalog No. 160 describes Pyro improved surface pyrometer which is all-purpose instrument with interchangeable expansion arms and thermocouples available in five styles with temperature ranges from 0 to 300 through 0 to 1200 F. Features and applications are covered. Special purpose surface pyrometers are described briefly also.

28. Research Service

Pittsburgh Testing Laboratories—28-page illustrated booklet gives detailed discussion on independent fact-finding functions such as testing of materials and research into nature of substance as well as routine physical and chemical analyses of all kinds.

29. Heat Treating Fixtures

Driver-Harris Co.—24-page illustrated bulletin No. F-46 describes heat treating fixtures for pit type furnaces. Bulletin provides possible solutions to pit type furnace loading problems. Special fixture designs are discussed.

30. Laboratory Equipment

Laboratory Equipment Corp.—20-page illustrated loose-leaf type catalog describes 2200, 2400, 2800 and 3000-degree laboratory furnaces, carbon determinator, sulphur determinator, purifying train, circulating pump and wide range of ceramic ware for laboratory use. Price list is included.

31. Mobile Crane

Unit Crane & Shovel Corp.—4-page illustrated bulletin No. 46-A presents data on Unit 357 self-propelled mobile crane which is quickly convertible to shovel, trencher, backfiller, clamshell, dragline, pile driver or magnet. Dimensional data and general specifications are given.

32. Blowers & Exhausters

Allen Billmyre Div., Lamson Corp.—20-page illustrated bulletin No. B-5 describes centrifugal type blowers and exhausters for almost every application. Capacity tables, features of design and general specifications are included to assist buyers in selecting proper equipment

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HAVE YOU CONSIDERED - -

A Carman Foundry Wage Incentive System—

Progressive Flow Molding, Cleaning & Core Operations—

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A Survey And Report Will Show The
Best Possibilities In Your Plant
With Modernized Methods

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BASIC, MALLEABLE, FOUNDRY
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SMILLIE
CORE BOX
Air Release Vents

ACCEPTED BY MANY FOUNDRIES

Made of selected brass, outside diameter held to close tolerance for easy inserting in core box. Slots are deep so that head of vent may be machined to fit any contour without being removed from the plate. SMILLIE Vents give greater vent area and greater performance. Write for full information on the vent as well as cleaning tool and inserting drill.

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1124 WOODWARD HGTS., FERNDALE 20, MICH.
FLASK PINS & BUSHINGS • INSERTING DRILLS FOR VENTS

Want Perfect Pattern Contour for Your Castings?

BUCKEYE "3-IN-1" FLASK GUIDES

(Patented)

MAKE EVERY LIFT A PERFECT LIFT!

You get a true perpendicular lift every time — when you use Buckeye "Three-In-One" Flask Guides — no rocking or shifting of the cope is possible. No ruined molds.

For precision lifts, perfect pattern contour, lowered costs and stepped-up production, specify Buckeye "Three-In-One" Patented Flask Guides for all straight or tapered flasks. Furnished in 3, 4, 5, 6, 7 and 8" lengths. Write for full details and prices today!

Patented "3-in-1" Flask Guides prevent cope from shifting while being lifted from drag!

THE BUCKEYE PRODUCTS COMPANY

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Manufacturers of Core Oil • Parting • Core Compounds • Refractory Cements • Flask Fittings

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IMMEDIATE FUSION WITH MOLTEN METAL PREVENTS LEAKS

Buffalo "LEEK-PRUF" CHAPLETS

In both Double (shown) and Single Head types of "Buffalo" *LEEK-PRUF* Chaplets, the chief factor of efficiency is the exclusive fin design.

Integral with the stem, this extremely thin section protrudes to its full width. There is no recess in the stem to cause weakness. The advantages of this original fin design speak for themselves.

- Positive fusion with molten metal—no chance for leakage.
- Burns in more easily.
- Does not chill molten metal.
- Stem is always full size—hence stronger.

CATALOG NO. 14

Complete information, full range of sizes, on double and single head (round or square) chaplets, as well as many other types.

MAILED ON REQUEST

Trial samples of any chaplets furnished without charge.

Combined SUPPLY & EQUIPMENT CO., INC.

211 CHANDLER ST., BUFFALO 7, N. Y.

Dry Molds Faster • Easier

HAUCK Compressed Air *OIL BURNERS*

A necessity for busy foundries: Instantly regulatable flame from 1700° to 2100° F., for drying any molds, large, small, shallow, deep or delicate. Lightweight, portable, convenient, economical.

Made for use with compressed air or in hand pump types with oil tank capacities from ½ to 15 gal. Burner lights instantly. Other Hauck Burners for ladle heating, cupola lighting, preheating furnace linings, etc.

Write for Cat. 1043

HAUCK MFG. CO., 106 Tenth St., Brooklyn 15, N. Y.

COMPLETE ENGINEERING SERVICE

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ALL TYPES OF FOUNDRIES

FOUNDRY LAYOUTS

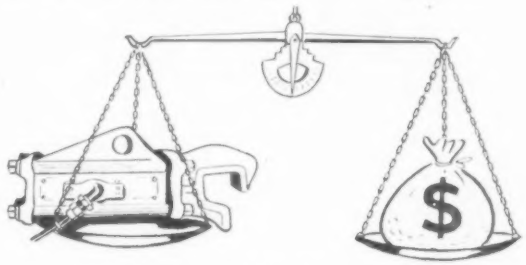
Sand Handling, Molding and Pouring Systems for Steel, Cast Iron and Non-Ferrous Foundries

COFFEY ENGINEERING COMPANY

Room 303, Plainfield Savings Bank Building, Plainfield, N. J.

"BRANFORD" FLASK RAPPER

Worth its weight in gold—



TO THE ASSAYER — NO!
BUT TO THE FOUNDRYMAN — YES!

The "Branford" Flask Rapper is cutting flask cleaning costs enormously in hundreds of foundries.

It is a proven product for over twenty years.

Popular for its range of operation. Made in seven sizes to take flasks with 1" wall or less up to flanges 8½" in width, and capable of handling a range of flasks 20" sq. up to 20' x 24' x 4' deep, green or dry sand.

If you have not investigated the possibilities for "Branford" Shakeout equipment in your foundry, it will pay you dividends to do so.

WRITE FOR INFORMATION ON ALL TYPES OF "BRANFORD" SHAKEOUTS

1915 BRANFORD VIBRATORS U.S.A.

New Haven Vibrator Company

130 CHESTNUT ST. NEW HAVEN 7, CONN.

NOW

a Moisture Meter
FOR FOUNDRY SANDS

An electronic instrument combining advanced electrical science with sound procedure and practical for plant use in most molding and core sands. Quick manual readings, ¼% accurate and either relative or % of moisture when set for one type sand.

Two systems in one unit,—portable, on-the-spot testing or with a.c. when amplification is desired. Constant reading permits possible adaptation to conveyor systems in many cases. Large meter, steel case, 8 x 12 x 6 deep, attractively finished. Special manual type sand prod for density correction. Your sand samples can be meter-tested in our laboratory.

Prompt deliveries. Distributors wanted.

MFD. BY

J. THOS. RHAMSTINE • HARLINGEN, TEXAS

Schmieg CENTRI MERGE

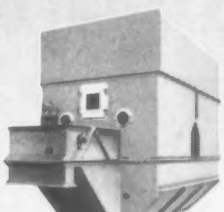
PRODUCTION FINISHING SYSTEMS

SPRAY BOOTHS

FRESH AIR SUPPLY SYSTEMS

OVENS—DRYING and PROCESSING

DESIGNED . . . BUILT . . . INSTALLED to Synchronize with Your Production Line . . .



CENTRI-MERGE Collection Units are available in capacities to handle any air cleaning job—small or large. May be installed singly or in batteries, depending upon volume of air to be handled.

If you are contemplating a new installation, or a rearrangement of your present equipment that involves any of the products listed above, Schmieg engineers can be of valuable assistance. They will gladly make recommendations to meet your production requirements without cost or obligation to you.

THE *best* AIR PURGE is CENTRI-MERGE

Schmieg INDUSTRIES INC.
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302 PIQUETTE AVENUE • DETROIT 2, MICHIGAN

GRINDERS... ALL KINDS!

FOR VITRIFIED AND HIGH SPEED WHEELS.

SINGLE OR MULTIPLE SPEED.

MOTOR DRIVEN — BALL BEARING

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VISIT OUR
BOOTH No. 1914

The No. 30 Grinder, made in sizes of 5 H.P. for 18" wheels up to 15 H.P. for 30" wheels. Larger motors to order. The distance between wheels is 55" or 59".

- Boiler Plate Steel Guards, adjustable to wheel wear
- Multiple V-belt Drive.
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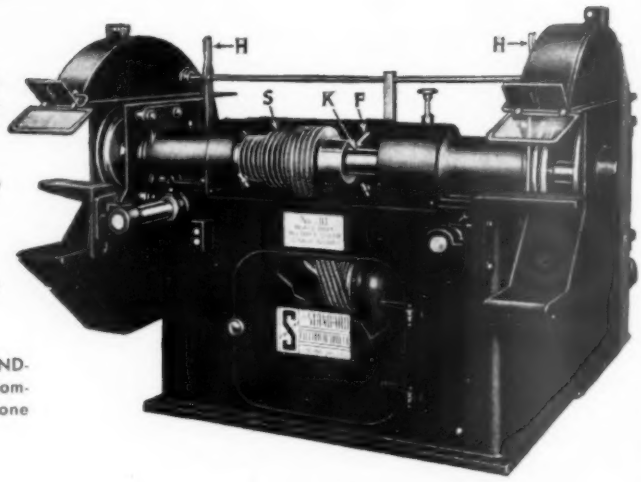
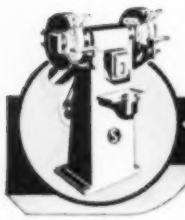


NO. 30 (30" 15 H.P. Illustrated)



Write for our Complete Catalog which describes "GRINDERS—all kinds!", from ½ H.P. to 30 H.P. Also a complete line of Disc Grinders. Long Distance phone Wabash 1677.

The STANDARD ELECTRICAL TOOL Co.
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STANDARDIZE WITH STANDARD

SAVE "DOWN TIME" AND REPAIRS

OPERATE AIR TOOLS WITH

CLEAN DRY AIR

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USE MURPHY SEPARATORS

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Employing four positive principles of separation, the Murphy "Type A" Separator carries a money-back guarantee to deliver clean, dry air to point of use. Completely automatic separation and ejection. No moving parts to receive wear. No filters to renew. Requires neither attention nor maintenance. Install it . . . and forget it; it's guaranteed. Write for literature and prices.

GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

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Moisture Elimination Up To 3000 Pounds Per Square Inch

WOOD AND METAL PATTERNS

FOR QUALITY, SERVICE, AND DEPENDABILITY.

CALL US FOR FREE ESTIMATE

ROYAL PATTERN WKS.
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Special FOUNDRY SHOES

SLOPED EDGE SOLES TO CARRY OFF SPILLAGE

No. 887 Men's Black 5½ Congress Shoes. Black composition outersole, leather undersole, 13 nailed rubber heel, steel shank, Approved Steel Safety Box Toe, nailed construction. E width, sizes 6 to 12. (No 1114.)

APPROVED STEEL SAFETY BOX TOE

No. 884 Men's Black 5½ Congress Shoes. Black composition outersole, leather undersole, 13 nailed rubber heel, steel shank, nailed construction, Plain Toe (no Safety Box), nailed construction. D width, sizes 6 to 12. (No 1116.)

GENERATIONS OF EXPERIENCE IN MAKING SHOES OF VALUE FOR INDUSTRIAL WORKERS IS AT YOUR DISPOSAL

ALL SAFETY SHOES

TITAN SAFETY SHOE CO.
212 ESSEX ST., BOSTON 11, MASS.

Write for Complete Catalog

X-RAY
INSPECTION SERVICE

Available to

FOUNDRIES AND MANUFACTURERS IN THE MIDDLE WEST

FOR

MAGNESIUM • ALUMINUM • IRON • STEEL
COPPER • BRASS • BRONZE

SIZE

From ⅛" to 6" in thickness—all sizes of units up to 12' in length. Work entrance into x-ray room 12' high, 10.5' wide, 6' clearance above door for positioning of tube head.

STRUCTURE

Castings, welds and welded structures, high pressure vessels, and boilers.

EQUIPMENT

(a) 220,000 volt unit for light alloys and thin steel sections.
(b) 1,000,000 volt unit for medium and heavy sections.

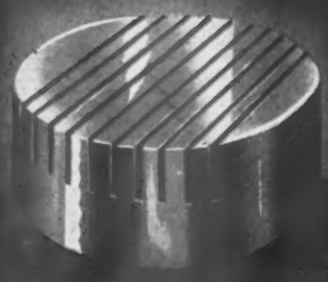
PRICES

Based on time, equipment and type of work to be done.

Laboratory Division

AUTO SPECIALTIES MANUFACTURING CO.
St. Joseph, Michigan

Precision



CORE BOX VENTS

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

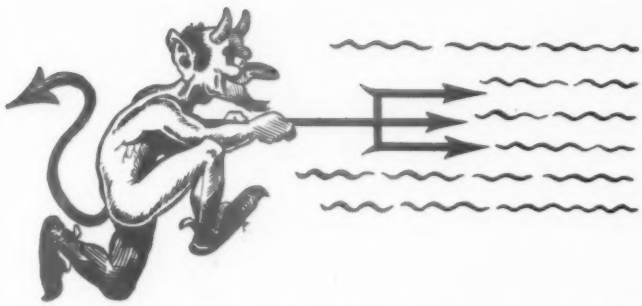
BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: ⅛", 3/16", ¼", 5/16", ⅜", 7/16", ½", ⅝", ¾", ⅞", 1", 1¼", 1½"

SPECIFICATION CIRCULAR ON REQUEST

Wm. **DEMMLER** *& Bros.*
Kewanee, Illinois



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SOFFEL'S FLUXES FOR FERROUS AND NON-FERROUS METALS

THERMOTOMIC COMPOUND is an exothermic material which can be molded and baked into any desired shapes just as sand cores are made. It produces a temperature of 3500° F. It is used as ring inserts under the risers or feeding heads, or as facing inserts where it is desirable to maintain the fluidity of metal in the mold at those points where rapid cooling may cause piping, shrinkage, or segregation. Great savings are realized through reduced riser dimensions and cleaning costs. Yield is increased as much as 50% or more. A large steel foundry reported a saving of $1075 on 50 castings using the THERMOTOMIC material. Let us help you realize similar benefits in YOUR foundry.

SOFFEL'S CARBON-FREE LIQUIDIZER

CARBON-FREE LIQUIDIZER is an exothermic feeding head compound, which, when applied on the molten metal in heads and risers, reacts with itself exothermically producing a temperature of 3150° F or more. This heat actually raises the temperature of the feeding metal well above that of the metal in the main body of the casting, thus ensuring that the feeding heads will be the last to solidify. CARBON-FREE LIQUIDIZER also acts as a deoxidizer and adds fluidity to the metal. Tensile strength and transverse are greatly increased. When used in the ladle, in addition to increasing fluidity, it also purifies and refines the metal. Carbon-Free Liquidizer should ALWAYS be used to promote better feeding of castings, and also in conjunction with Thermotomic compound. Neither Thermotomic Compound nor Carbon-Free Liquidizer will contaminate any metal in any way.

SOFFEL'S BB-2 BRASS FLUX

BB-2 Brass Flux adds fluidity to brass and bronze, and imparts greater tensile strength to the metal. It will remove cuprous and cupric oxides from any brass or bronze. BB-2 BRASS FLUX is recommended for use in open flame or crucible furnace for melting of red brass, aluminum bronze, manganese bronze, and for refining borings and turnings. BB-2 BRASS FLUX is a perfect deoxidizer and degasifier and forms a chemical union with sulphur, carbon, iron, and the sulfides that may be present and occluded in the metal. It will positively remove iron from any brass or bronze except aluminum and manganese bronze. Many foundries have found metallic deoxidizers unnecessary when using SOFFEL'S BB-2 BRASS FLUX. BB-2 BRASS FLUX will keep crucibles and furnace linings clean and will save metal losses through dross skimmings; which alone will more than pay the cost of its use.

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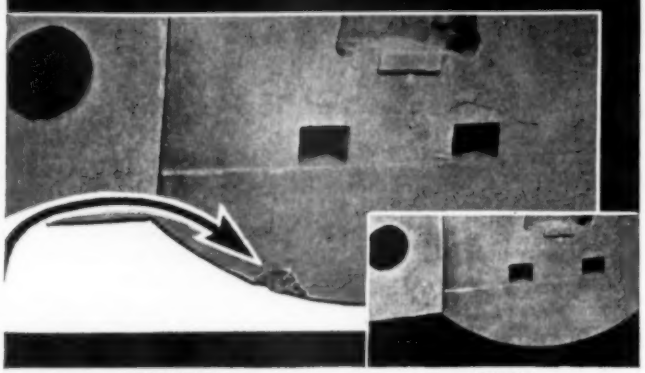

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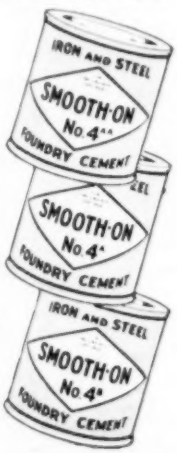

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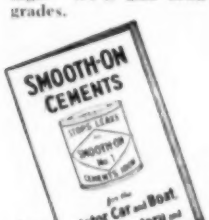

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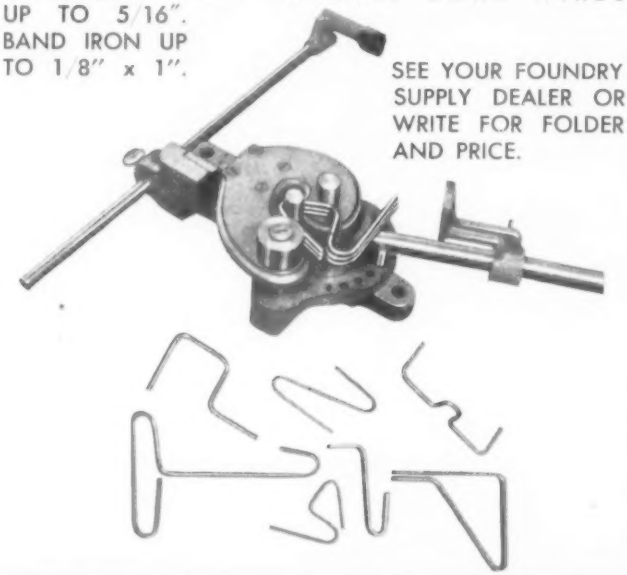

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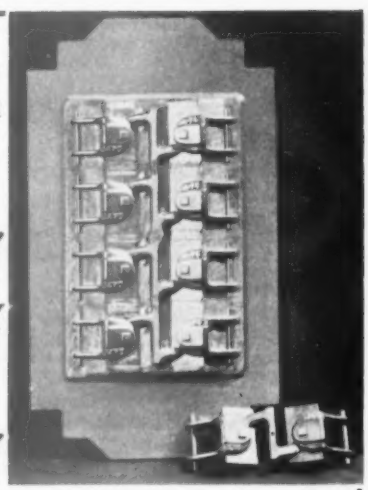

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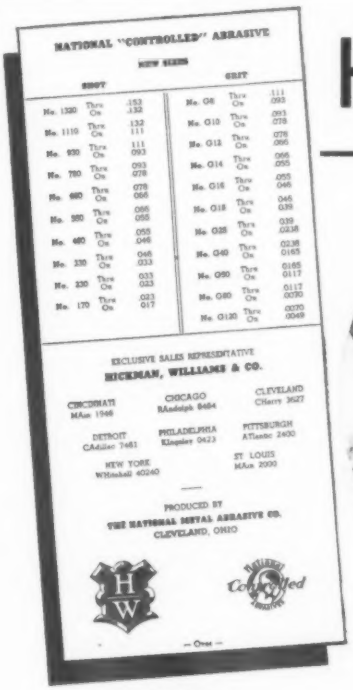
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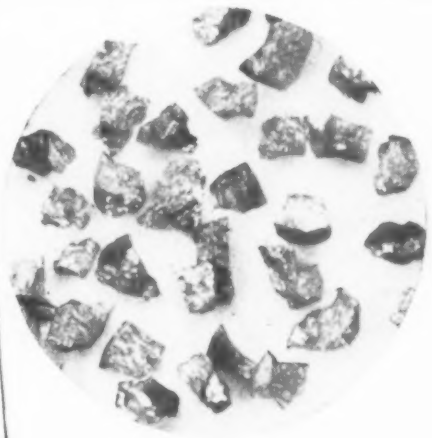

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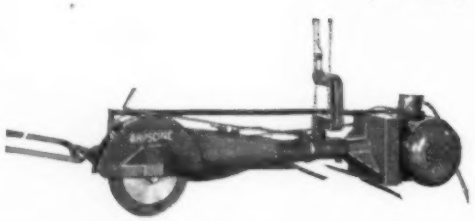

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Coremakers, Inc., 4435 West Division St., Chicago 51, Ill.

CORES (Annealing)
Pressed Steel Co., Wilkes-Barre, Pa.

CORES (Commercial)
Coremakers, Inc., 4435 West Division St., Chicago 51, Ill.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., Westfield, N. Y.

CRANES (Bucket)
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANE LUBRICATING SYSTEMS
Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Electric Traveling)
American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Gantry)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Hand Traveling)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 3960 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.

CRANES (Monorail) (Cont'd.)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-Propelled)
Hughes-Keenan Co., Mansfield, Ohio

CRUCIBLES
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
National Crucible Co., Mermaid Lane and Queen Sts., Philadelphia 18, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES
Ajax Electrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.

CRUCIBLE LIFTERS
Modern Equipment Co., Port Washington, Wis.

CRUCIBLE POURING DEVICES
Modern Equipment Co., Port Washington, Wis.

CRUSHERS (Core)
Simplicity Engineering Co., Durand, Mich.

CUPOLAS
Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA BLOWERS
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT
Carman, Edwin S., Lee Rd., at Mayfield, Cleveland 18, O.
Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA LININGS
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.
Ironton Fire Brick Co., Ironton, O.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.
United States Graphite Co., Saginaw, Mich.

CUPOLA SPARK ARRESTORS
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Chicago, Ill.

CUTOFF MACHINES (Abrasive)
Clipper Mfg. Co., 2800 Warwick St., Kansas City 8, Mo.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

DARK ROOM ACCESSORIES (X-Ray)
Eastman Kodak Co., Rochester, N. Y.

DARK ROOM PROCESSING (Chemical Tanks, etc.)
Eastman Kodak Co., Rochester, N. Y.

DEGASIFIERS
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS
Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
American Smelting & Refining Co., 120 Broadway, New York 5.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS (Ferrous)
Carborundum Co., Perth Amboy, N. J.

DESULPHURIZERS
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.
Modern Equipment Co., Port Washington, Wis.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIE CASTING MACHINES
Lester-Phoenix Inc., 2711 Church St. Cleveland 13, Ohio

DIES
Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Lester-Phoenix Inc., 2711 Church St. Cleveland 13, Ohio
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio

DIRECT FIRED HEATERS
Dravo Corp., Neville Island, Pittsburgh 25, Pa.

DOWEL PINS
Standard Horse Nail Corp., New Brighton, Pa.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, O.

DRILLS (Electric)
Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.

DRILLS (Pneumatic)
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Schramm Inc., West Chester, Pa.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., Westfield, N. Y.

DRUMS (Magnetic)
Dings Magnetic Separator Co., 4720 W. McGeough, Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S 28th St., Milwaukee 4, Wis.

DUMP HOPPERS
Buda Company, Harvey, Ill.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUMP TRUCKS
Phillips Mine & Mill Supply Co., 2227 Jane St., Pittsburgh 3, Pa.

DUST ARRESTING EQUIPMENT
American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Buell Engineering Co., 14 Cedar St., New York 5, N. Y.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS
Goergen Machwirth Co. Inc., 817 Sycamore St., Buffalo, N. Y.
Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.
Schmieg Industries, 6560 Cass Ave., Detroit 2, Mich.

DUST COLLECTORS (Shake-out)
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich

DUST RECOVERY SYSTEMS
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Buell Engineering Co., 14 Cedar St., New York City 5.
Kirk & Blum Mfg. Co., Cincinnati 25, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

DUST REMOVAL SYSTEMS
U. S. Hoffman Machinery Corp., 105 4th Ave., New York 17, N. Y

ELECTRIC FURNACES (See Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS
Standard Conveyor Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St. Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd. Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

ELEVATORS (Material Handling)
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

ELEVATORS (Pneumatic, Material Handling)
Fuller Company, Catasaqua, Pa.

ENGINEERING SERVICE (Foundry)
Carman, Edwin S., Lee Rd. at Mayfield, Cleveland 18, O.
Coffey Engineering Co., 308 Park Ave., Plainfield, N. J.
Conover Engineering Co., 1740 East 12th St., Cleveland 14, O.

ENGINEERING SERVICE (Foundry) (Cont'd.)
Engineering Service Inc., 610 West Michigan St., Milwaukee 3, Wis.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich. York, Pa.
Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.
A. H. Putnam Co., 1319 2nd Ave., Rock Island, Ill.
Reichert, W. G., Engineering Co., 1060 Broad St., Newark, N. J.
Wickland Co., A. A., 205 W. Wacker Dr., Chicago 6, Ill.

ENGINEERING SERVICE (Permanent Mold)
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio

EXHAUST SYSTEMS
American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.
Propellair Inc., Springfield, O.
Schmieg Industries, 6560 Cass Ave., Detroit 2, Mich.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FABRICATORS (Metal)
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St. New York 17, N. Y.
Stevens Inc., Frederic B., Detroit 26, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

FANS (Ventilating, Exhaust, Cooling, etc.)
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, O.

FEEDERS (Rotary)
Fuller Company, Catasaqua, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Newaygo Engineering Co., Newaygo, Mich.

FEEDERS (Sand)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FERROBORON
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME
Hickman-Williams & Co., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.

FERROMOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILLET (Wax, leather, wood)
PMS Co., 1701 Power Ave., Cleveland 14, O.

FILM (X-Ray)
Eastman Kodak Co., Rochester, N. Y.

FILTERS (Air)
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FINISHING EQUIPMENT
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.

FIRE BRICK
Carborundum Co., Perth Amboy, N. J.
Davis Fire Brick Co., Oak Hill, Ohio
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester 6, Mass.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.
Stevens Inc., Frederic B., Detroit 26, Mich
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati, Ohio

FIRE CLAY
Eastern Clay Products, Inc., Jackson, O.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Robinson Clay Products Co., 1100 Second National Bldg., Akron, Ohio.
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati, Ohio

FIRE SAND
Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FIRESTONE
Cleveland Quarries Co., 1740 E. 12th St., Cleveland 14, O.

FLASK BANDS
Chicago Mfg. & Distributing Co., 1928 W. 46th St. Chicago 9, Ill.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, Ohio

FLASK BUSHINGS
Hines Flask Co., 1324 Hird Ave., Cleveland 7, Ohio
Universal Engineering Co., Frankenmuth, Mich.

FLASK PINS
Diamond Clamp & Flask Co., Richmond, Ind.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, Ohio
Universal Engineering Co., Frankenmuth, Mich.

FLASKS (Aluminum)
Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

FLASKS (Dowmetal)
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

FLASK FILLERS
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

FLASKS (Slip)
Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)
Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div. Rockwell Mfg. Co., Freeport, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Stevens, Inc., Frederic B., Detroit 26, Mich
United Pattern Works, 2309 Russell St., Detroit 7, Mich.

FLASKS (Steel)
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio

FLASK FITTINGS
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio
Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland, Ohio

FLASK LIFT MACHINES
Beardsley & Piper Co., 2424 No. Cicero, Chicago 39, Ill.

FLASK LUMBER
Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.

FLASKS (Wood)
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.

FLEXIBLE SHAFT MACHINERY
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Strand Co., N. A., 5001 N. Wolcott Ave., Chicago 40, Ill.

FLOORING (Non-Slip)
Norton Co., Worcester 6, Mass.

FLUXES
Carbon Limestone Co., Youngstown, Ohio
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Foundry Services, Inc., 280 Madison Ave, New York 16, N. Y.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.
National Pigment Co., East York St., Philadelphia, Pa.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FOUNDRY COAL (Anthracite)
Hudson Coal Co., Scranton, Pa.

FOUNDRY LAYOUT & METHODS
Engineering Service Inc., 610 West Michigan St., Milwaukee 3, Wis.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc. 600 West Jackson Blvd., Chicago 3, Ill.

FOUNDRY NAILS
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SYSTEMS
Engineering Service Inc., 610 West Michigan St., Milwaukee 3, Wis.

FOUNDRY SUPPLY HOUSES
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Inc., Jackson, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Stevens, Inc., Frederic B., Detroit 26, Mich.

FURNACES (Aluminum & Magnesium Billets)
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.

FURNACES (Aluminum & Magnesium Forgings)
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.

FURNACES (Aluminum Melting)
Ajax Engineering Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.

FURNACES (Aluminum Rivet Heating)
Ajax Electric Co., Inc., Philadelphia 23, Pa.
Despatch Oven Co., Minneapolis 14, Minn.

FURNACES (Annealing)
Campbell-Hausfeld Co., Harrison, Ohio.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
56 Church St., New York 7, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Crucible Melting)
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 25, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Eclipse Fuel Engrg. Co., 711 So. Main St., Rockford, Ill.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.

FURNACES (Electric Melting) (Cont'd.)

Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Forging)

R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.

FURNACES (Gas or Oil Fired)

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Denver Fire Clay Co., 2301 Blake St., Denver, Colo.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.

FURNACES (Gray Iron Melting)

American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Heat Treating)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.

FURNACES, HEAT TREATING (Electric)

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.

FURNACES (Malleable Annealing)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
General Electric Co., Schenectady, N. Y.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

FURNACES (Malleable Melting)

American Bridge Co., Pittsburgh 19, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Nonferrous Melting)

Ajax Electrothermic Corp., Trenton, N. J.

FURNACES (Nonferrous Melting) (Cont'd.)

Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Powdered Coal)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACES (Steel Melting)

Ajax Electrothermic Corp., Trenton, N. J.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

FURNACE BLOWERS

Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Roots-Connersville Blower Corp., Connersville, Ind.

FURNACE BOTTOMS

Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.

FURNACE LININGS

Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Ironton Fire Brick Co., Ironton, O.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
United States Graphite Co., Saginaw, Mich.
Whitman Co., 1407 Esperonza St., Los Angeles 23, Calif.

GAGES

Acme Aluminum Alloys Inc., Dayton 3, Ohio.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio

GAGGERS

Federal Foundry Supply Co., 4600 E. 71st., Cleveland 5, O.

GAS

American Gas Association, 420 Lexington Ave., New York 17, N. Y.

GAS (Oxygen, Acetylene, Industrial)

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

GAS BURNERS

Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Fisher Furnace Co., 2543 West Hubbard St., Chicago 12, Ill.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

GLOVES (Industrial, Safety)

American Optical Co., Southbridge, Mass.

GLUE (Liqui-Plastic)

Wellman Products Co., 1444 E. 49th St., Cleveland 3, O.

GOGGLES and EYE PROTECTORS

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.
Wilson Products Inc., Reading, Pa.

GRAPHITE

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
United States Graphite Co., Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio
Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.
U. S. Electrical Tool Co., Cincinnati 4, O.

GRINDERS (Flexible Shaft)

Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.

GRINDERS (Pneumatic Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio

GRINDERS (Surface, Bench, Disc, Floor)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Standard Electrical Tool Co., 2488 Riverside Ave., Cincinnati 4, Ohio.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago 40, Ill.
U. S. Electrical Tool Co., Cincinnati 4, O.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDERS (Swing Frame)

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Sutter Products Co., Dearborn, Mich.
Vonnegut Moulder Corp., 1815 Madison Ave., Indianapolis 2, Ind.

GRINDING WHEELS—See ABRASIVE WHEELS

GRINDING WHEEL DRESSERS

Carborundum Co., Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co., Urbana, O.
Vincent Steel Process Co., 2424 Bellevue St., Detroit 7, Mich.

GRINDSTONES

Bay State Abrasive Products Co., Westboro, Mass.
Sterling Grinding Wheel Div., Cleveland Quarries Co.

GRIT (Abrasive)

Alloy Metal Abrasive Co., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Carborundum Co., Niagara Falls, N. Y.
Clayton Sherman Abrasives Co., 3896 Lonyo Rd., Detroit 10, Michigan.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.

HAMMERS (Chipping)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Schramm Inc., West Chester, Pa.

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

HEAT CONTROL AND RECORDING DEVICES

Foxboro Company, Foxboro, Mass.
Claude S. Gordon Co., 3000 So. Wallace, Chicago 9, Ill.
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

HEATERS (Gas, Oil, Electric)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Despatch Oven Co., Minneapolis 14, Minn.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp., Trenton, N. J.

HEATERS (Indirect Fired)

Despatch Oven Co., Minneapolis 14, Minn.

HEATERS (Space, Unit, Direct Fired)

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

HEATERS (Space, Unit, Oven, Water)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

HELMETS (Blasting)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Mine Safety Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh 8, Pa.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

HELMETS (Welding)

American Optical Co., Southbridge, Mass.

HOISTS (Air)
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.

HOISTS (Chain)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.

HOISTS (Electric)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Modern Equipment Co., Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

HOISTS (Hand)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Clinner Mfg. Co., 2800 Warwick St., Kansas City 8, Mo.

HOSE (Air, Blasting, Water, Gas)
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

HYDRAULIC CLEANING EQUIPMENT
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 208 W. 71st St. Cincinnati 16, O.

ILLUMINATORS (X-Ray Film)
Eastman Kodak Co., Rochester, N. Y.

IMPREGNATING SYSTEMS
Empire Varnish Co., 2636 E. 76th St., Cleveland 4, O.

INDUSTRIAL ENGINEERING SERVICE
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

INGOT MOLDS
Acme Foundry Co., Detroit 16, Mich.

INGOTS (Nonferrous)
Ajax Metal Co., Philadelphia 23, Pa.
Aluminum Company of America, Pittsburgh, Pa.
Aluminum & Magnesium Inc., Sandusky, O.
American Smelting & Refining Co., 120 Broadway, New York 5.
Apex Smelting Co., Chicago, Ill.
Cleveland Electro Metals Co., W. 38th St. & NP RR. Cleveland 13, O.
Federated Metals Div., American Smelting & Ref. Co., New York 5.
General Smelting Co., Philadelphia, Pa.
International Nickel Co., Inc., 67 Wall St., New York City 5.

INGOTS (Nonferrous) (Cont'd.)
Jobbins, Wm. F., Inc., Aurora, Ill.
Lavin & Sons R., Inc., Chicago, Ill.
National Smelting Co., Cleveland, O.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, New York.
Silverstein & Pinsof, Inc., 1720 N. Elston, Chicago 22, Ill.
U. S. Metals Refining Co., New York.
U. S. Reduction Co., E. Chicago, Ind.

INJECTION MOLDING MACHINES
Lester-Phoenix Inc., 2711 Church St. Cleveland 13, Ohio.

INOCULANTS
Carborundum Co., Perth Amboy, N. J.

IRON CEMENT
Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

IRON ORE
Bethlehem Steel Co., Bethlehem, Pa.
Pickands, Mather & Co., Cleveland 14, O.

INSPECTION SERVICE (X-Ray)
Auto Specialties Mfg. Co., St. Joseph, Mich.

IRON OXIDES
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.

JACKETS (Mold)
Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
United Pattern Works, 2309 Russell St., Detroit 7, Mich.

LABORATORY EQUIPMENT (Chemical)
Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Precision Scientific Co., 3737 Courtland St., Chicago 47, Ill.

LABORATORY EQUIPMENT (Physical)
Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.
Precision Scientific Co., 3737 Courtland St., Chicago 47, Ill.

LADLES
Bethlehem Steel Co., Bethlehem, Pa.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Industrial Equipment Co., Minster, O.
Modern Equipment Co., Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE HEATERS
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

LADLE LININGS
Ironton Fire Brick Co., Ironton, Ohio.

LATHE CENTERS
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

LEAD
American Smelting & Refining Co., 120 Broadway, New York 5.

LETTERS (Pattern)
Wellman Products Co., 1444 E. 49th St., Cleveland 3, O.

LIMESTONE
Carbon Limestone Co., Youngstown, Ohio

LOADERS
Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

LUBRICANTS (Industrial)
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Swan-Finch Oil Corp., R. C. A. Bldg., West, New York 26, N. Y.
United States Graphite Co., Saginaw, Mich.

LUMBER (All kinds)
Dougherty Lumber Co., 4300 East 68th St., Cleveland 5, O.

MACHINE KEYS
Standard Horse Nail Corp., New Brighton, Pa.

MAGNESIUM (Ingots)
Apex Smelting Co., 2534 Fillmore St., Chicago 12, Ill.

MAGNET CONTROLLERS
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.

MAGNET GENERATORS
Power Plants Inc., 1755 E. 33rd St., Cleveland 14, Ohio.

MAGNETS
Dings Magnetic Separator Co., 4740 W. McGeough, Milwaukee 7, Wis.
Ohio Electric Mfg. Co., 5906 Maurice Ave., Cleveland, Ohio.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

MANGANESE (Briquets)
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

MATCHPLATES
Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

MATERIALS HANDLING
Hughes-Keenan Co., Mansfield, Ohio

MECHANICAL ENGINEERS
Engineering Service Inc., 610 West Michigan St., Milwaukee 3, Wis.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

MELTING POTS
Acme Foundry Co., Detroit 16, Mich.

METAL CLEANING EQUIPMENT
American Wheelabrator & Equipment Co., Mishawaka, Ind.
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

METALLOGRAPHIC EQUIPMENT
Buehler Ltd., 228 N. LaSalle St., Chicago 1, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Precision Scientific Co., 3737 Courtland St., Chicago 47, Ill.

METALLURGISTS
Crobough Co., Frank L., Blackstone Bldg., Cleveland, Ohio.
W. G. Reichert Engineering Co., 1060 Broad St., Newark, N. J.

METERS (Gas, Air, Water)
Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.
Roots-Connersville Blower Corp., Connersville, Ind.

MICROSCOPES
Buehler, Ltd., 228 N. LaSalle. Chicago 1, Ill.

MIXERS (Core Wash)
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

MIXERS (Sand and Clay)
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Co., Waterloo, Iowa.
Freeman Supply Co., 1152 Broadway Toledo 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Rover Foundry & Machine Co., Kingston, Pa.

MODELS (Wood)
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio

MOLD CONVEYORS
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Roto-Cast Foundry Equipment Inc., 100 Grand St., Coldwater, Mich.

MOLD DRYERS
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.

MOLD OVENS and DRYERS
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., Cleveland 13, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Young Bros. Co., 6508 Mack Ave., Detroit 7, Mich.

MOLD TRUCKS (Power Operated)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

MOLDING MACHINES
Adams Co., Dubuque, Iowa.
Arcade Manufacturing Div. Rockwell Mfg. Co., Freeport, Ill.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Berkshire Mfg. Co., 1111 Power Ave., Cleveland 14, O.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.

MOLDING MACHINES (cont'd)

Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, 228 Second St., Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pioneer Mfg. Co., West Allis, Wis.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

MOLDING MACHINES (Jolt)

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING MACHINES (Rollover)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Sutter Products Co., Dearborn, Mich.

MOLDING MACHINES (Squeeze)

Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, 228 Second St., Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING SANDS

Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Industrial Silica Corp., Stambaugh Bldg., Youngstown, O.
Ottawa Silica Co., Ottawa, Ill.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.
Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

MOLD WASH

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., Saginaw, Mich.

MOLYBDENUM

Molybdenum Corporation of America, Pittsburgh 19, Pa.

MONORAIL SYSTEMS

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

MOTORS (Electric)

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

NAILS (Chill)

Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Cleveland 4, O.
Standard Horse Nail Corp., New Brighton, Pa.

NICKEL

International Nickel Co., Inc., 67 Wall St., New York City 5.

NOZZLES (Blasting)

Alloy Metal Abrasives Co., 311 W. Huron St., Ann Arbor, Mich.
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

OIL BURNERS

Fisher Furnace Co., 2453 West Hubbard St., Chicago 12, Ill.
Hauck Manufacturing Co., 106 Tenth St., Brooklyn 15, N. Y.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 300 W. Adams St., Chicago 6, Ill.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

OPTICAL PYROMETERS

Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.

OVENS (Annealing and Heat Treating)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Foundry Equipment Co., Cleveland 13, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Lindberg Engineering Co., 2450 West Hubbard, Chicago 12, Ill.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Core) (See CORE OVENS)

OVENS (Enameling, Japanning)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Mold)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.

OXYGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

PARTING COMPOUNDS

Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Superior Flake Graphite Co., 33 S. Clark St., Chicago 3, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN COATINGS

American Lacquer Solvents Co., Phoenixville, Pa.
PMS Co., 1701 Power Ave., Cleveland 14, O.

PATTERN COMPOUND

Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

PATTERN LETTERS

Freeman Supply Co., Toledo 5, O.

PATTERN LUMBER

Dougherty Lumber Co., Cleveland 5, O.
Freeman Supply Co., Toledo 5, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.

PATTERN PLATES

Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
PMS Co., 1701 Power Ave., Cleveland 14, O.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Plastic Corp. of Chicago, 2444 So. Central Ave., Cicero 50, Ill.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, O.

PATTERN PLATE STOCK

Freeman Supply Co., 1152 Broadway, Toledo 5, O.

PATTERN SHOP EQUIPMENT

Do All Company, Des Plaines, Ill.
Freeman Supply Co., Toledo 5, O.
Oliver Machinery Company, Grand Rapids 2, Mich.
Strand, N. A., Co., 5001 Wolcott Ave., Chicago 40, Ill.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, O.

PATTERNS

Pressure Cast Products Co., 1028 Vermont Ave., Detroit 16, Mich.

PATTERNS (Wood, Metal)

Acme Aluminum Alloys Inc., 232 North Findlay St., Dayton 3, Ohio.
Aero Pattern & Engineering Co. 8607 Grand River Blvd, Detroit 4, Mich.
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International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

TAPER PINS
Standard Horse Nail Corp., New Brighton, Pa.

TEMPERATURE CONTROLLERS
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.

TESTING EQUIPMENT
Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

TESTING LABORATORIES
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

TESTING MACHINES (Tensile)
Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.

THERMOCOUPLES
Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

TIERING MACHINES (Power)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TIMERS (Electric)
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

TONGS
Industrial Equipment Co., Minster, O.

TOOLS, CUTTING (Carbide)
Severance Tool Industries Inc., Saginaw, Mich.

TOOLS (Pneumatic Portable)
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas
Dayton Pneumatic Tool Co., Dayton 1, O.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Sullivan Division, Michigan City, Ind.
Schramm Inc., West Chester, Pa.

TORCHES and BURNERS (Acetylene, gas, oil)
Freeman Supply Co., Toledo 5, O.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.

TOTE BOXES (see "BOXES-TOTE")

TRACTORS (Gas Powered)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TRAMRAIL SYSTEMS
American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O

TRAMRAIL SYSTEMS (Cont'd.)
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TROLLEYS
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCK BATTERIES (Industrial)
Electric Storage Battery Co., Allegheny Ave. at 19th St., Philadelphia 3, Pa.

TRUCK CRANES
Hughes-Keenan Co., Mansfield, Ohio

TRUCKS (Dump)
Phillips Mine & Mill Supply Co., 2227 Jane St., Pittsburgh 3, Pa.

TRUCKS (Industrial)
Buda Company, Harvey, Ill.

TRUCKS (Power Lift)
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TRUCK WHEELS
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TUBES (Annealing)
Pressed Steel Co., Wilkes-Barre, Pa.

TUMBLING BARRELS
Cleveland Chaplet & Mfg. Co., 1197 West 67th St., Cleveland 2, O.
Haynes Foundry Equipment Co., 814 Ada St., Kalamazoo 21, Mich.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES
Beardsley & Piper Co., The 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Roto-Cast Foundry Equipment Inc., 100 Grand St., Coldwater, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNIT HEATERS
Dravo Corp., Neville Island, Pittsburgh 25, Pa.

UNLOADERS (Portable-Gas, Electric)
Bosworth Engineering Co., 6723 Denison Ave., Cleveland, Ohio.

VALVES (Air, Water, Steam)
Air-Way Pump & Equipment Co., 405 S. Jefferson St., Chicago 7, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, O.
R-S Products Corp., 4530 Germantown Ave., Philadelphia 44, Pa.

VALVES (Adjustable Orifice)
North American Mfg. Co., 4455 E. 71st St., Cleveland 4, Ohio.

VALVES (Blow-off and Cut-off)
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Wm. H. Nichols Co., Richmond Hill, Long Island 18, N. Y.

VENTILATING SYSTEMS
American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Joy Mfg. Co., La-Del Division, New Philadelphia, Ohio.
Newcomb-Detroit Co., Inc., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Swartwout Co., 18511 Euclid Ave., Cleveland 15, Ohio.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

VENTILATORS (Roof)
Swartwout Co., 18511 Euclid Ave., Cleveland 15, Ohio.

VENTS (Core Box)
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.

VIBRATORS
Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Cannon Vibrator Co., 111 Power Ave., Cleveland 14, Ohio.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Martin Engineering Co., Kewanee, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Nichols Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

VISES (Air Operated)
Van Products Co., Erie, Pa.

WARM AIR HEATERS
Dravo Corp., Neville Island, Pittsburgh 25, Pa.

WASH ROOM EQUIPMENT
Bradley Washfountain Co., Box 732, Milwaukee 1, Wis. Milwaukee, Wis.

WAX (Core, Vent, Pattern)
PMS Co., 1701 Power Ave., Cleveland 14, O.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

WELDING APPARATUS (Electric Arc)
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee 14, Wis.

WELDING and CUTTING APPARATUS and SUPPLIES
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

WELDING ELECTRODES (Carbon)
National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES
Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.

WHEELBARROWS
Construction Machinery Corp., Waterloo, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keystone Abrasive Wheel Co., Carnegie, Pa.
Raybestos Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa
Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

WHEELS (Wire)
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE BENDERS
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

WIRE BRUSHES
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE CUTTERS
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

WIRE NAILS
Republic Steel Corp., Cleveland 4, O.

WOOD FLOUR
Ace Foundry Materials Co., 14611 Fenkell Ave., Detroit 27, Mich.

WOODWORKING MACHINERY
Do All Company, Des Plaines, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT
Allis Chalmers Mfg. Co., Milwaukee 1, Wis.

X-RAY FILMS
Eastman Kodak Co., Rochester, N. Y.

X-RAY INSPECTION SERVICE
Auto Specialties Mfg. Co., St. Joseph, Mich.

ZINC
American Smelting & Refining Co., 120 Broadway, New York 5, N. Y

Classified Advertising

Help Wanted

STEEL FURNACE MELTER

New, small and progressive steel foundry requires a capable melter for one ton Greene Electric Furnace. Some laboratory experience desirable but not essential. Lots of work on hand. Write details of qualifications, experience and salary expected.

FOOTHILLS STEEL FOUNDRY & IRON WORKS LTD.
CALGARY, ALBERTA, CANADA

SALESMAN

Complete line foundry and pattern shop supplies and equipment. Well known company representing a number of best known machinery manufacturers as well as having own line. Established territory. Detroit area. No representation in this territory at present. Address: Box 553, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPPLIES SALES REPRESENTATIVES

Wanted by manufacturer of high grade core oils. Good trade already established in many states. Only men with established following in their territory need apply. Address: Box 555, The FOUNDRY, Cleveland 13, Ohio.

MANAGER OF MANUFACTURING

Well established manufacturer of gray iron castings in East with normal employment of 500 requires an executive foundryman with ability to take complete charge of manufacturing operations. Company produces quality castings for farm, automotive, machinery and miscellaneous manufacturers on semi-production basis. Write in detail education, experience, type of product manufactured and references. Address: Box 569, The FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Steel Foundry in New England has opening for Industrial Engineer with experience in establishing wage incentive plan in all departments. Preliminary work required in obtaining proper work flow, motion analysis, etc. Excellent opportunity for permanent position and advancement. In replying give all details of experience, salary desired, etc. All replies kept confidential. Address: Box 525, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Experienced squeezer foreman, having good knowledge of squeezer department work. Must be able to analyze and correct causes of scrap, and know thoroughly gating and risering of patterns for gray iron casting semi-production shop. Write about yourself including the type of jobs worked on, scrap record, technical knowledge, references and starting salary expected. Address: Box 570, The FOUNDRY, Cleveland 13, Ohio.

ASSISTANT FOREMAN

Assistant Foreman in a new, modern gray iron foundry. Fully mechanized—all squeezer work. Must be capable of supervising 18 molders, coremakers and pouring. Plant located in Kentucky. State age, experience and salary expected. Address Box 494, The FOUNDRY, Cleveland 13, Ohio.

COREROOM SUPERVISOR

Top notch man to organize and operate efficiently a coreroom employing 200 persons. Must be well grounded in management principles, and have good technical background for the production of cores for gray iron foundry, producing work for some of the leading farm equipment, automotive and machine manufacturers of the country. Write giving summary of past experience, list references, state starting salary expected and when available. Address: Box 573, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

For cope and drag machines. Must be capable of handling men and running a department efficiently. State fully experience, reference and salary expected. Address: Box 571, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

For grey iron foundry. Must be capable of assuming complete charge of operations. Job shop and railroad castings. Permanent position. Southwest location. No housing problem. Address: Box 545, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

SALES ENGINEER

to sell

STEEL CASTINGS

(Carbon, Alloy Stainless)

THE LUDLOW VALVE MFG. CO.

TROY, NEW YORK

METALLURGIST

Grey iron and semi-steel foundry now being mechanized desires to employ metallurgist to handle cupola and sand controls and such other work as is customary. Prefer young man with some experience in mechanized foundry. Permanent position. South-Central Pennsylvania location. Address: Box 403, The FOUNDRY, Cleveland 13, Ohio.

SOME GOOD FOUNDRY MAN

Living in or around Chicago, who is familiar with modern foundry practice to represent us in and around Chicago. One with no previous sales experience and not over 50 years of age. This will be a good steady job with a fast growing company if you can qualify. Accompany application with a brief description of your experience and personal qualifications. Address: Box 563, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Experienced foundry man, with good knowledge of foundry equipment, plant layout, material flow and foundry methods. Must have knowledge of pattern and core box equipment and be able to estimate weight from blue prints and to design flask equipment. Mechanical engineering background desirable. State age, experience, references, education and salary desired. Address: Box 502, The FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER FOREMAN

Supervisory position open for man with wood and metal supervisory experience. Must be fully qualified in all phases of patternmaking. Opening with progressive manufacturing organization located in Indiana. State complete work history, salary, etc, in first letter. Address: Box 537, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Young man with technical or trade school training preferred, must have actual experience on foundry production. Knowledge of sand slingers desirable, but not essential. Excellent opportunity for advancement. Good wages according to ability to produce. State age, married or single and experience in detail. Correspondence confidential. Address: Box 546, The FOUNDRY, Cleveland 13, Ohio.

ACTIVE MELTING FOREMAN

Experienced in grey iron cupola practice—continuous pouring operation. State experience, qualifications and age. Plant located in Cleveland, Ohio. Address: Box 583, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN—SANDSLINGER

Capable of training and handling present crews to turn out first class quality production with low scrap record. Must be tactful, exceptional organizer with good sandslinger and technical background. Write in detail education, work experience and references. Address: Box 572, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY METALLURGIST

Excellent opportunity for Metallurgist in electric steel Foundry located in the East. Should be capable of assuming full charge of melting, heat treating, sand control and testing in the production of small and medium sized carbon and alloy electric steel castings. All replies kept confidential. In replying give age, experience, salary desired, etc. Address: Box 526, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

RESIDENT MANUFACTURER'S AGENT

Boston, Mass. Territory for well established nonferrous foundry. Address: Box 549, The FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVES

For Detroit, Chicago, Cleveland and Pittsburgh areas. Foundry compounds used by all types of foundries. Foundry or metallurgical experience desirable; car necessary. Salary and commission. Address: Box 559, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY IN NEW ENGLAND

Mechanized—desires young metallurgist or chemist to assist plant metallurgist on sand and metal control and to qualify for foremanship. Address: Box 551, The FOUNDRY, Cleveland 13, Ohio.

SALESMEN

To sell revolutionary type lighting fixture to foundries. Large potential, choice territories available, exclusive basis. See our ad in July issue. Address: THE MIDWEST LIGHTING PRODUCTS CO., 1357 BEACH PARKWAY, CLEVELAND 7, OHIO.

STEEL FOUNDRY SUPERINTENDENT

Eastern steel foundry has opening for a General Superintendent to assume charge of all operations in the production of small and medium sized carbon and alloy electric steel castings. In replying give age, experience, salary desired, etc. All replies kept confidential. Address: Box 528, The FOUNDRY, Cleveland 13, Ohio.

PARTNER

To manage new sand and permanent mold foundry, gray iron, aluminum and brass. Will make a very attractive proposition to right man. Must be able to invest some capital. Address: Box 581, The FOUNDRY, Cleveland 13, Ohio.

SALES PROMOTION

EXPERIENCED SALESMAN TO INTRODUCE NEW CORE BINDERS AND PASTES TO FOUNDRY INDUSTRY; ABILITY TO START SALES PROMOTION PROGRAM FROM BEGINNING. SUBMIT EXPERIENCE RECORD, SALARY EXPECTED AND ENCLOSE SNAPSHOT. ADDRESS: BOX 444, THE FOUNDRY, CLEVELAND 13, OHIO.

REPRESENTATIVE

In Ohio and vicinity to handle Eastern molding sand. Some foundry experience advisable. Good trade already established. State qualifications and experience. Address: Box 503, The FOUNDRY, Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

Eastern Steel Foundry has opening for a Cleaning Room Foreman capable of handling all operations in the cleaning and heat treating of small and medium sized carbon and alloy electric steel castings. In replying give age, experience, salary desired, etc. All replies kept confidential. Address: Box 527, The FOUNDRY, Cleveland 13, Ohio.

FOREMEN

With side frame and bolster experience. Excellent opportunity with large foundry in Western Pennsylvania. Address: Box 567, The FOUNDRY, Cleveland 13, Ohio.

MOLDING FOREMAN

For responsible position in a completely modernized grey iron foundry in Indiana. Permanent position with opportunity for advancement in a progressive and expanding company. Give complete qualifications, salary expected, etc. in first letter. Address: Box 536, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Opportunity for competent gray iron molding foreman experienced on production lines. Good salary plus monthly performance bonus. Progressive midwest foundry. Address: Box 554, The FOUNDRY, Cleveland 13, Ohio.

ASSISTANT TO PRODUCTION MANAGER

Must have experience equivalent to general superintendent of ferrous and nonferrous foundry. Apply in writing to: Box 552, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Help Wanted

CORE OIL SALESMAN

Chicago area. Must have experience and good sales record. Address: APEX MOTOR FUEL CO., 1401 WEST NORTH AVE., CHICAGO 22, ILL.

FOUNDRY SUPERINTENDENT

Bronze, aluminum jobbing foundry, large plant, New York City, thoroughly experienced man only familiar with rigging, patterns, working and running large scale jobbing production plant. Address: Mr. A. Most, Vice President (Personal) Parkway Foundry & Machine Corp., 59 Paidge Avenue, Brooklyn, New York.

Positions Wanted

SUPERINTENDENT—METALLURGIST

Father and son combination. Father age 50 with 28 years' practical experience in all phases of foundry operations including design, layout, costs, selling, rigging and production. Son graduate metallurgist with 3½ years' practical experience, expert in metal and sand control. Desire positions with progressive and modern foundry. Will accept reasonable salary for opportunity to be together. Best business and character references. Address: Box 596, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Whose mature, profit-building, sanely aggressive qualifications will become an immediate asset to a company wishing to stabilize sales and production costs and prepare to meet future reactionary competition. Experience includes fifteen years as general manager of medium size foundry and machine companies with results that assure ability to carry complete executive responsibility and develop maximum possibilities. Address: Box 587, The FOUNDRY, Cleveland 13, Ohio.

MASTER MECHANIC

Desires connection with large modern foundry. Twenty-five years' practical experience in supervising installation and maintenance in complete sand handling equipment, specializing in designing modern labor saving devices and development of higher production in gray iron, brass and aluminum foundries. Address: Box 477, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Available, skilled as a mechanic in jobbing and mechanized ferrous operations. Successful with management personnel relationships. Fifteen years as top executive with reputable concern. Address: Box 565, The FOUNDRY, Cleveland 13, Ohio.

STANDARDS & METHODS

Are you looking for a capable and industrious leader for your Standards & Methods Dept.? Twenty years' experience in malleable, gray iron and steel foundries. If you want better methods, increased production and reduction in cost, then let your problems be handled by a well qualified foundry engineer. Address: Box 283, The FOUNDRY, Cleveland 13, Ohio.

PRODUCTION CONTROL

Young married man, seven years' general experience in covering most phases of foundry work. Worked five years in charge of foundry production, shipping, personnel and purchasing. Have good knowledge of actual foundry practices. Employed at present in responsible position. Would like very much to make contact with firm in California or Arizona. Able to furnish very good references. Address: Box 579, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Desires connection with a progressive concern. Eighteen years practical experience in ferrous and nonferrous jobbing and production in dry, green and loam sands. Ten years in management and supervision. Age 40, married, college graduate. Marvelous ability to handle men. Best references. Service available soon after agreement. Address: Box 584, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT NONFERROUS FOUNDRY MASTER MOLDER

Broad practical experience on steam valves, plumbing, hardware, art bronze, jobbing and production work. Address: Box 578, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

PATTERNMAKER

Have line of cast grey iron or aluminum toys including very old penny banks and modern trucks. Would like to contact foundry interested in making these toys. Have thirty years' general patternshop experience in wood or metal. Can take over pattern work and make it show profit. Location anywhere. Address: Box 564, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Wants to make new connection. Capable, progressive and qualified to direct all foundry activities. Practical experience and technical knowledge. Broad experience producing quality castings. Light, medium and heavy-green and dry sand. Practical and well versed in cupola operation, metallurgy and mix iron by analysis. Cost minded, middle age and good personality. Address: Box 509, The FOUNDRY, Cleveland 13, Ohio.

CHARGE OF CORE ROOM

Desires position in charge of core room. Must be in complete charge. Have over twenty years' experience. Honest and ambitious, experienced in grey iron and aluminum. Address: Box 360, The FOUNDRY, Cleveland 13, Ohio.

PLANT ENGINEER

Established company, leader in its field, must because of reduction of activities, dispense with the services of a competent plant engineer also fully experienced in handling personnel and production problems. M.I.T. graduate with broad experience ranging from production and transport flow control and aeroplane template design to five years in charge of layout, equipment and property maintenance in modern foundry. This man can be most highly recommended as a loyal, constructive team-worker who puts forth all time and effort necessary for company interest. Address: Box 548, The FOUNDRY, Cleveland 13, Ohio.

PATERNMAKER FOREMAN

Mature, widely experienced in designing and constructing wood, metal and composition patterns, large and small for all classes of castings. Can solicit work and estimate cost from drawings, lay out work, make or supervise and set rates. First class mechanic. Can make wood or metal rush jobs in shop. Extended intimate foundry experience machines, core blowing, driers and gating. Address: Box 465, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

With 25 years' foundry experience in iron, steel and nonferrous metals, core room experience, high production experience on various lines of castings. Age 42. Producer of sound first quality castings. Address: Box 561, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST AND CHEMICAL ENGINEER AS ASSISTANT TO PLANT MANAGER

Age 34, married, two children. Ten years' steel foundry experience including that as department head, with 1½ years diversified foundry work. Qualified by education, experience and personal characteristics to assume responsibility for processes and controls. Can develop and train own force. Position should have a reasonably promising future. Full details and excellent references supplied upon request. Address: Box 550, The FOUNDRY, Cleveland 13, Ohio.

PATTERN SPECIALIST

Expert and experienced patternmaker looking for opportunity to introduce new and improved methods. Can handle any job, patternmaker, leading hand, foreman, superintendent, expediter, trouble shooter, solicitor, partner or part owner. Address: Box 521, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Grey iron, malleable and steel foundry experience. Technically trained. Knows mechanized foundry operation, sand and metal control. Successful record in reducing scrap losses. References submitted on request. Address: Box 539, The FOUNDRY, Cleveland 13, Ohio.

YOUNG FOUNDRY MANAGER

Thirteen years' experience in all phases of foundry work, supervision and management in both production and jobbing plants. An engineering graduate well qualified to give best results in any foundry assignment, steel and high alloy. Presently employed but desires more progressive employer. Address: Box 535, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

PRACTICAL FOUNDRYMAN

With twenty years as assistant foundry superintendent on electrical steel, open hearth steel, gray iron and semi-steel. At present foundry superintendent. Age 57, married. Reference if desired. Address: Box 455, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Wishes contact with a reputable company in need of a capable manager. Have a successful record in managing an entire plant producing a product requiring a large grey iron foundry operation pouring 60 ton daily. Forty-two years of age, good character. Address: Box 479, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRYMAN

Wants position as superintendent or general foreman in full charge. Practical nonferrous foundryman, technically trained. Broad working knowledge of all activities in production and jobbing foundries. Good rigger and can handle men. Address: Box 346, The FOUNDRY, Cleveland 13, Ohio.

METAL PATTERNMAKER AVAILABLE

Specializing in plumbing supplies and valves. Proven background in designing, supervising and constructing modern pattern equipment, match plates and core boxes to meet coreblowing requirements. Will guarantee results. Address: Box 532, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY MANAGER OR SUPERINTENDENT

McLain graduate, 25 years' experience in all phases of production or jobbing, also pattern engineering. Wishes to connect with medium sized foundry. Eastern states preferred. Address: Box 264, The FOUNDRY, Cleveland 13, Ohio.

SAND TECHNICIAN

Desires position with Eastern Foundry. Ten years' technical and practical experience. Address: Box 544, The FOUNDRY, Cleveland 13, Ohio.

INCREASE PRODUCTION ELIMINATE TROUBLES

All types of foundry problems solved by metallurgist and foundry production engineer, experienced in gray iron, semi-steel, brass, bronze and aluminum castings, molding, core making, grinding, cleaning and shipping. Address: Box 589, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY PRODUCTION ENGINEER

Practical foundry engineer with broad experience in reducing cost, increasing production and improving labor relations, thorough plant layout, methods, job evaluation and wage incentive. Licensed registered professional engineer would like to help you with your production and cost problems. Address: Box 541, The FOUNDRY, Cleveland 13, Ohio.

SALES REPRESENTATIVE

Gray Iron—nonferrous. Sand and permanent molds castings. A-1 contacts. For particulars reply Box 484, The FOUNDRY, Cleveland 13, Ohio.

TIME STUDY MAN

With experience as standard setter in foundry work open for position. Now employed but wishes to make change. Address: Box 576, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

Desires position with jobbing or production brass foundry. Ability to produce results and handle help. Ten years' supervisory experience. Available at once. Address Box 530, The FOUNDRY, Cleveland 13, Ohio.

YOUNG FOUNDRYMAN

Desires staff work leading to management responsibilities in progressive foundry organization. Will consider production management, cost control, engineering, planning, sales or personnel. Nine years' experience includes supervision of molding and coremaking, sand control, trouble shooting, heading and gating and radiography. Grey iron, malleable and steel. Graduate of reputable technical school. Address: Box 590, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

METALLURGIST

Graduate, over 10 years experience in control, research, and development of wrought and cast steels, gray iron, and malleable. Desires position with progressive manufacturing concern or foundry. Address: Box 599, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Would like a formanship. Have had a number of years' experience both dry and green sand. Experienced on machines and bumpers. Can oversee core room. Address: Box 594, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY SUPERINTENDENT OR FOREMAN

Fifteen years' practical foundry experience as molder and foreman. Have a good record of handling men. Wide experience in the manufacture of plumbing supplies (brass). 43 years of age. Available at once. Address: Box 595, The FOUNDRY, Cleveland 13, Ohio.

MECHANICAL-ELECTRICAL ENGINEER

Exceptionally broad experience in management, plant engineering, production layout and methods, tool, die and special machine design applying to the foundry, steel mill, forging, machining and metal fabricating industries. Address: Box 597, The FOUNDRY, Cleveland 13, Ohio.

Correspondence Course

GOOD FOUNDRYMEN ARE NOT AN ACCIDENT—THEY DO NOT MERELY HAPPEN

Foundrymen who will add the concisely arranged information on mixing, melting, and semi-steel to their store of experience will prove a valuable asset to any firm. Even though you know 90% of what we offer, the remaining 10% may be causing your firm large losses. Our report on your melting may be worth the fee alone. Remember, semi-steel is the purest, hottest and strongest metal made in the cupola. Synopsis free.

McCLAIN'S SYSTEM INC.
236 E. NORTH AVE.
MILWAUKEE 12, WIS.

Open Capacity

CASTINGS

Grey Iron
10 to 300 lbs.

FISHER & NORRIS
TRENTON, N. J.

OPEN CAPACITY
CASTINGS

Metallurgical controlled production of gray iron, semi-steel, brass, bronze and aluminum castings in jobbing, semi-production and mechanized production foundries. Address: Box 588, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

Central Wisconsin grey iron foundry. Plenty of coke and pig iron assures you prompt and quality service. Squeezer jobs preferred. Address: Box 580, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

Open capacity in grey iron foundry. Waterfronts—burners—bench, bumper and floor work. Address: P. O. Box 321, Belleville, Illinois.

OPEN CAPACITY

Aluminum foundry in Anniston, Ala. has open capacity for aluminum castings. Production or jobbing work. Address: J. C. Dean & Son, ANNISTON, ALABAMA.

Open Capacity

GRAY IRON CAPACITY

Ohio foundry can accept production runs for small castings under 30 lbs. Can also do machining if desired. Address: Box 388, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

Squeezer, jobbing, rollover work in grey iron castings. Quality and prompt service assured. Prefer squeezer assignments from mid-west section near our Kansas plant. Address: Box 339, The FOUNDRY, Cleveland 13, Ohio.

OPEN CAPACITY

Have open capacity for gray iron castings on cope and drag equipment. Address: THE TREATY COMPANY, GREENVILLE, OHIO.

OPEN CAPACITY

Grey iron foundry located South-Central Ohio desires production runs of small to 100 lbs. castings. Can handle some floor work and large castings. Address: Box 500, The FOUNDRY, Cleveland 13, Ohio.

Foundries for Sale

MODERN FOUNDRY FOR SALE

20,000 sq. ft., complete Bartlett & Snow sand system, latest type core ovens, streamlined layout, air-conditioned offices, used as aluminum foundry but can be converted to bronze or electric iron. One block from power sub-station. Location Detroit area.

BOX 598

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Small gray iron mechanized foundry, all equipment in excellent condition.

CAYUGA CORDAGE MFG. CO.
FOUNDRY DIVISION
44 WASHINGTON ST.
AUBURN, NEW YORK

FOUNDRY FOR SALE

All or part interest in GREY IRON JOBBING FOUNDRY. Light and heavy floors. Capacity: 15-20 tons per day. Location—near Cleveland, Ohio.

Box 582

The FOUNDRY Cleveland 13, Ohio

GRAY IRON FOUNDRY

Well equipped shop for production of light grey iron. Located in Middle West. Annual volume $200,000. Building under lease. Sale price $16,000.

BOX 592

THE FOUNDRY CLEVELAND 13 OHIO

GRAY IRON FOUNDRY

In automotive area. Production castings, contracted to capacity. Unusually interesting profits. Owner retiring. Address: Box 591, The FOUNDRY, Cleveland 13, Ohio.

PRODUCTION AND JOBBING FOUNDRY

70,000 square feet, for manufacturing gray iron, brass and aluminum castings. Daily capacity 20 tons gray iron, 5 tons nonferrous metal. 60" cupola, jolt squeezers, strippers, rollovers, bumpers, 2 core ovens, large assortment flasks. Going business. Pittsburgh district. Address: Box 382, The FOUNDRY, Cleveland 13, Ohio.

Foundries for Sale

FOR SALE
ALUMINUM FOUNDRY

Well equipped jolt squeezer production foundry. Employ 5 to 8 men. Located in small town near Detroit and Toledo and out of the high priced labor area. Help plentiful. Good trucking facilities. Foundry and office in separate brick buildings. Upstairs over half of foundry building suitable for storage and pattern shop. Plenty of land to expand. Will sell business, building and land, control or 100%. Other interests forces owner to sell. Address: Box 543, The FOUNDRY, Cleveland 13, Ohio.

SMALL GRAY IRON FOUNDRY

Eastern Pennsylvania. Well equipped, with good business and excellent product for sale on easy terms to person who can prove his integrity and ability to operate at a profit. Address: Box 542, The FOUNDRY, Cleveland 13, Ohio.

WILL SELL ALL OR PART

Of $150,000.00 stock in a gray iron foundry that has operated for 30 years. Would prefer to sell a minimum of $25,000.00 worth to man capable of taking active part in management. Depreciated book value approximate $200,000.00 would sell at par. Address: Box 482, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE

Up to date new gray iron foundry started last January 1st. Best of equipment, building leased reasonable, controlling interest for sale. Address: Box 314, Moorehead, Minn.

ALUMINUM FOUNDRY FOR SALE
REASONABLY PRICED FOR QUICK SALE

Complete with 6 jolt squeezer machines. 4 Campbell Hausfeld 300# gas furnaces, 2 large core ovens, 1 Royer sand conditioner, 3 grinders, saw, compressor and large selection of snap flasks and boards. Set up for high production. 3800 square feet floor space. Address: Box 577, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

One third interest in small grey iron shop, $3,000. Good reason for selling. Orders on hand fair. Located in Western Michigan. Address: Box 575, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Small brass and aluminum foundry. Has plenty of orders, needs management. Located in small town in Northern part of Michigan. Address: Box 574, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY

Small Northwestern Ohio gray iron foundry producing mostly castings from pla'ed patterns. Capacity 3 to 4 tons daily. Equipment in fine shape. Address: Box 586, The FOUNDRY, Cleveland 13, Ohio.

ALUMINUM PERMANENT MOLD FOUNDRY

Completely equipped for light and heavy manufacturing and assembly. With large separate enclosed paint and lacquer department equipped with spray booths, pressure tanks, compressors, etc. Modern brick factory building. Located near Bridgeport, Conn. Ten year lease, rent $400.00 per month. Approximately 18,000 feet. Address: A. L. Furpahs, 225 Fifth Ave., New York 10, N. Y. Murray Hill 3-8486.

FOUNDRY FOR SALE

Grey iron jobbing and semi-production foundry now in operation with small connecting aluminum and brass foundry. Located in rapidly expanding industrial Southwest. Materials available and excellent labor and climatic conditions. Equipped with rollover, jolt squeeze machines, muller, wheelabrator and all necessary equipment. Excellent opportunity for future growth. Address: Box 593, The FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

One—3' x 8' model BG Simplicity shakeout machine. Address: GUNITE FOUNDRIES CORP., ROCKFORD, ILLINOIS.

WANTED

SB-15 or SB-17 International core blowing machine. Address: Box 566, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Wanted-To-Buy

GRAY IRON FOUNDRY

Wanted to buy, or lease with purchase option medium size gray iron foundry, preferably in Michigan, Ohio or Indiana. Are now operating small foundry and seeking larger quarters with room for expansion. Address: Box 585, The FOUNDRY, Cleveland 13, Ohio.

WANTED

One electric arc furnace capacity ½ to one ton with hand or automatically operated electrodes. One electric arc furnace type "W" lectromelt or similar. Address: Box 568, The FOUNDRY, Cleveland 13, Ohio.

WANTED

One #60 or 70 Speedmullor (loader not necessary).
The Dayton Steel Foundry Co.
P.O. Box 1022 Dayton 1, Ohio.

WANTED

International jolt squeezer for stack molding. Give age and price. Address: Box 471, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Type AA sand cuter, gas driven, cutting blades 52" wide, outside width of wheels 74". Address: Sanitary Company of America, Linfield, Pa.

WANTED TO PURCHASE

Completely or the majority interest in a grey iron foundry equipped with molding machine for light production work in Eastern Pennsylvania, New Jersey, New York or Connecticut. Must be reasonably priced. Address: Box 426, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY Cleveland 13, Ohio.

WANTED

Whiting 3½ Cupola with or without blower, motor, skip hoist charger or Foxboro Control. Must be in good condition. Address Box 493, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Detroit rocking furnace 300 to 700 lbs. capacity or induction furnace 100 to 300 lbs. in good condition with transformer and controls. Address: Box 520, The FOUNDRY, Cleveland 13, Ohio.

WANTED

One complete 7½ or 10 ton overhead crane, 60'0" span, for A.C. current, 220 volt, 3 phase, 60 cycle, for inside service. Address: Box 600 The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS
$2,500-$25,000

This thoroughly organized confidential service of 37 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

SALARIED PERSONNEL

$3,000—$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, DEPT. T, 109 CHURCH STREET, NEW HAVEN, CONN.

Opportunities

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products ADDRESS: BUCKEYE COOPERAGE STATION C P.O. BOX 1501, CLEVELAND, OHIO.

Opportunities

OPPORTUNITY

To buy or lease equipment for the manufacture of Eureka Colney coal burning brooder stoves. Moulding machines with aluminum patterns, over head crane with pouring device, sheet metal machinery and good will of old es.ablished business. Opportunity for someone with small foundry to add another line with established market and large repair and replacement parts business. Equipment in Pottstown, Pa. and must be removed by purchaser. In reply state financial reference. Address: Box 547, The FOUNDRY, Cleveland 13, Ohio.

For Sale

FOUNDRY EQUIPMENT AVAILABLE FOR IMMEDIATE DELIVERY, SUBJECT TO PRIOR SALE

#9 Model B Whiting cupola, late model, f.o.b. Mansfield, Penna.	$1850.00
#31½ Cupola without blower, 51" inside dimension, in good condition.	$1250.00
American sand cutter, with motor	$ 550.00
Core ovens, oil fired, size 6 x 6 x 6 ft.	$ 400.00
#1 Model Tableblast, manufactured by the American Wheelabrator Corp., 6 ft. table, late model, rotoblast	$1850.00
1 pr. 36 x 54 Whiting tumbling mills	$ 150.00 ea.
2 pr. 30 x 54 Whiting tumbling mills	$ 140.00 ea.
28 x 21 International power rollover draw molding machine	$ 220.00
1 Master bench rammer, size 1S, serial #74013 peen	$ 45.00
1 Keller bench rammer, size 4D, serial #K25212	$ 45.00
Schutte & Koerting tilting type tumbling and washing barrel, geared, inside dimensions of barrel 24" deep, 28" wide, inside of barrel 1⅜" bronze lined, self-contained, V-belt motor drive with A.C. motor for rotating barrel, push button controls	$ 450.00

BILLARD MACHINE & TOOL COMPANY
PHONE 44 MANSFIELD, PENNA.

FOR SALE

Stainless Steel Welding Electrodes 25/20 Type #310

20,000 lbs. ¼" Diameter—A. O. Smith Mfg.

20,000 lbs. 5/32" Diameter—A. O. Smith Mfg.

20,000 lbs. 3/16" Diameter—Harnischfeger Mfg.

Price 25c per lb.—Minimum order of 500 lbs. f.o.b. Philadelphia, Pa.

J. A. DOUGHERTY
156 Vassar Road Bala-Cynwyd, Pa.

FOR SALE

New core wire and rods
40,000 lbs. ⅛ inch by 14 inches
5/32 inches by 14 inches. 25 bundles.
60,000 lbs. 7/16 inches by 10 ft. 6 inches

WALLACK BROS.
7400 S. DAMEN AVE.
CHICAGO 36, ILL.

CUPOLA FOR SALE

Used #66 Etting 10 ton cupola with #8 Sturtevant blower and a Welchans 54" x 72" charging floor elevator. Cupola shell 66" O.D. 34' high, air chamber 96" O.D. Dismantled and in good condition.

BUCH MANUFACTURING CO.

ELIZABETHTOWN, PA.

For Sale

EQUIPMENT FOR SALE

MOLDING MACHINES
1—Tabor Combination Jar Rollover Pattern Draw, 40" x 50" Table, 21" Draw, Capacity 2000 lbs.
1—#274 Osborn Plain Squeeze.
3—75J Osborn Portable Jolt Squeeze, Strain Rod Type.
2—Tabor Plain Squeeze, Strain Rod Type.
3—Mumford 3" Cyl. Core Jolt, with 20" x 15" Table.

BLOWERS FOR CUPOLAS AND FURNACES
6—#805 General Blowers, 5 H.P., 3/60/220, 1400 C.F.M. at 8-oz. pressure.
Maxon-Premix Blowers for Gas, ⅛ to 1 H.P.

METAL MELTING EQUIPMENT
1—Style #800 Single Burner Stationary #70 crucible Furnace for gas, complete with lining and #8-A Blower and Motor—220 Volt.
1—Style #600 Single Burner Tilting #150 Crucible Furnace for Gas, complete with lining and #7 Blower and motor—220 Volt.
2—Hausfeld 1000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired.
2—Hausfeld 2000# Aluminum Capacity Furnaces, Barrel Type, Open Flame, Oil Fired.
1—Aluminum Electric Heat Treating Unit, 75 KW, 220 Volt, Batch Type, with Basket and Quench Tank.
2—Hausfeld Open Flame Tilting Brass Furnaces, 400# capacity, Gas or Oil.
3—Stationary Gas Fired #60 Crucible Furnaces, with ¼ H.P. Maxon-Premix Blowers.
2—Monarch-Rockwell Rotating, 500# Brass, Oil. New 32" to 41" Dia. Shell Cupolas made to order.

TUMBLING MILLS AND SAND BLAST
2—(New) Baird No. 3-D Oblique Tumbling Mills, 27" Dia. 30" deep, direct motor drive, with motor driven tilting mechanism. Load capacity approx. 400 lbs.
4—New Haven 36" x 46" Self Contained Sand Blast Barrels, Belt Drive.
2—Pangborn Syphon Feed Sand Blast Cabinets.
3—Portable Sand Blast Generator Tanks, 500# Sand Cap.

MISCELLANEOUS
1—NB 2 Roye: Sand Separator with motor 110 V.
1—Type V Combs Foundry Riddle with motor.
1—#4 DG Fired Swarthout Core Oven Complete —110 V.
4—Shake-outs, approx. 4' x 6'.
1—⅜ Yd. Electric Grab bucket for overhead crane use.
1—Heavy Duty Back Geared Sprue Cutter, 1½" square knives, T. & L. pulley drive.
1—No. 1 Blystone Sand Mixer, 7 cu. ft., 5 H.P. 3/60/220-440, motor connected.
1—Cloth Screen Dust Collector.
6—Worm Geared Tilting Ingot Mold Stands, 6' to 12' long.
7—Hydro-Whirl, Wet Type, Dust Collecting Booths, suitable for Magnesium, Aluminum, Brass, etc, 5' x 3' working table and collecting system built as complete unit.
2—Hydro-Whirl, Wet Type, Collectors for double end grinders.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST.
CINCINNATI 3, OHIO
PHONE PARKWAY 7812

TURBO BLOWERS

2100 cfm @ 10 oz. Spencer, with 10 HP, 220/440 V. 3/60/3600 RPM motor.
(4) 675 cfm @ 6 oz., Spencer, driven by 2 HP, 220/440 V., 3 ph, 60 cycle 3600 RPM

PRESSURE BLOWERS

1400 cfm @ 8 oz., Robinson with 5 HP, 3ph, 60 cy, 3600 RPM motor
1100 cfm @ 16 oz. Sturtevant 8 x 8, 24" dia. wheel
800 cfm @ 24 oz. Amer. Blower with 10 HP, 220/440 volt, 3 ph, 60 cy, 3600 RPM
500 cfm @ 14½ oz. McKee 6 x 6 with 5 HP, 3600 RPM
250 cfm @ 12 oz. North American with 2 HP, 3/60 3450 RPM motor

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND 14, OHIO
CLEVELAND 14, OHIO

FOR SALE

(1)—No. 2 Simpson intensive mixer, with drive off to side and with new spare parts. First class condition. Used very little.

BOX 556
THE FOUNDRY CLEVELAND 13, OHIO

Classified Advertising

For Sale

FOR SALE

Ingersoll-Rand Air Compressor, XRB #53201-2.

L. H. side #53201PP 7 x 10

R. H. side #53202PP 11 x 10

Discharge pressure 90 lbs. per square inch 250 CFM

Motor—G. E. Slip ring, #3948210. 50 H.P. 220 volts, A.C. 3 phase, 60 cycle, 685 RPM.

Recently installed, new H.C. piston, new rings, new bearings, and new intercooler tube nest. The motor has been completely overhauled and entire equipment is in perfect running order. The compressor weighs about 6,200 lbs. and the motor and controller, not crated, approximately 1,800 lbs.

The price is $1,500.00, F.O.B. our plant, subject to prior sale.

BOX 562

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

1—10 ton Northern Overhead Crane, 50′ span, 215-230 Volt DC with generator set—Price $4000.00

1—6 ton Northern Overhead Crane, floor controlled, 215-230 Volt D.C. 46′ span—Price $2000.00

1—Ingersoll-Rand Steam Air Compressor. Steam cylinder 10 x 10; Air cylinder 12 x 10 Serial #34826—Price $1000.00

1—Herman Jolt Rollover Machine 40″ x 72″—Price $500.00

3—Core Oven Cars, approx. 6′ x 9′ for 58″ gauge track—Lot $500.00

5—Core Oven Drawers with wheels; size 3′ x 7′—Lot $350.00

4—Core Oven Drawers with wheels; size 4′ x 9′6″—Lot $350.00

1—U. S. Electric Variable Speed Grinding Stand, 220-440 volt—Price $300.00

All prices net cash and f.o.b. Anderson, Indiana. Write or Phone P. B. Lavelle, Box 798, Anderson, Ind., Phone 4441.

FOR SALE

Whiting hydro-clone spark suppressor for #4 Whiting cupola. Has been kept painted and never been used. Will sacrifice for $1250.00, cost new $2500.00.

NUTMEG CRUCIBLE STEEL CO.
BRANFORD, CONN.

FOR SALE

Long established, successful, gray iron foundry, located on Niagara frontier. Owner wishes to retire.

BOX 558

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Tumbling Barrel; Globe #24, cast iron shell, countershaft driven—Price $300.00.

Federal Foundry Supply Co.,
4600 East 71st St. Cleveland, Ohio
Phone MIchigan 8125

FOR SALE

Cupola Blowers
1 size 5 Root's Blower
1 size 1 Root's Blower
Both in good condition.

BOX 538

THE FOUNDRY, CLEVELAND 13, OHIO

FOR SALE

Detroit electric furnace, type AA; rated for melting 1000 lbs. Cold metal with holding capacity up to 3000 lbs. Complete with all accessories. Used four years, excellent condition and may be seen in operation. Just the type of furnace for your special ferrous alloys. For further information contact: WILLIAMS BROTHERS, NEW BRITAIN, CONN.

For Sale

FOR SALE

40—tons transite core plates, 12 x 13, 20 x 23, 30 x 6, 12 x 16 and 13 x 20.

Monarch Horizontal Melting furnace, complete with blower 42″ x 66″.

10″ and 12″ roller conveyor.

All above items in excellent condition.

We also have to offer a complete line of USED foundry equipment of all types and description. Send us your inquiries!

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD ST.
SHILLINGTON, READING, PA.

FOR SALE

1—Whiting #9½ Model B Cupola section E 45′ with Tuyeres, Self segments, arranged for 9″ thick lower lining, C.I. charging door frame wishbone and grapple.

1—3 Ton capacity Horseshoe charging trolley 11′ span 34′ lift equipped wtih GE 3 HP and 15 HP traction and lift slip ring motor 3-60-220 60 FPM drum controllers, resistance grids, including switches, trolley system, etc.

BOX 523

THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE
FISHER FURNACE

Oil fired size 400 type MNP serial #2195. Address: CENTRAL BRASS MFG. CO., 2950 E. 55th ST., CLEVELAND, OHIO. PHONE MICHIGAN 8938.

FOR SALE

1 Whiting 46″ crane ladle approximately 5 ton capacity. Practically new with V bail and worm gears. Address: Box 557, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE—SAPLINGS

2″ to 4″ dia. 20′ to 30′ long oak, poplar and beech well adapted for working malleable heats. Address: Joseph Nimon, RR #1, Plymouth, Indiana.

FOR SALE

Operating molding sand business in State of Wisconsin. Pits in two locations. This going business must be sold to settle estate. Address: R. H. Larson, Admin., c/o Burlington National Bank, Burlington, Wis.

FOR SALE

1 Used Wickes No. 420 heavy duty sprue cutter, 1¼″ stroke with 5 H.P.—440 v.—3 Phase—60 cycle motor. Address: Box 447, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

No. 4 Whiting cupola. Address: PORTLAND STOVE FOUNDRY, PORTLAND, MAINE.

EQUIPMENT FOR SALE

One Osborn No. 405 lot rollover pattern draw moulding machine. Excellent condition. Address: Box 505, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

New heavy duty motorized rod cutter, 65 cuts per minute; capacity: ¾ inch round hot rolled steel. Brand new. $890.00 f.o.b. Cleveland. Address: The Federal Foundry Suply Co., 4600 East 71st St., Cleveland 5, Ohio.

FOR SALE

Air compressor Chicago Pneumatic V belt drive, 2 stage air intercooler. 160 C.F.S. Excellent condition. Tank and safety valve motor pulley—no motor—$600.00. Nearly new dust collector. Cyclone type. Suitable for sand blast room—$300.00. Address: Box 560, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

1—Beardsley & Piper stationary riddle type sandslinger, 2 speed head with 2 ton plate feeder and skiphoist. Pratically new. Address: Box 540, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

20—13″ and 14″ combination Jolt Squeeze Strip Molding Machines, completely overhauled.

Sutter Products Co.,
2005 Westwood Ave., Dearborn, Michigan

For Sale

FOR SALE

Electrically Heated Vertical Pot-Vulcanizer or Plating Tank

1—72″ diameter x 78″ deep Adamson vertical pot vulcanizer, 125 pounds pressure, practically new, has quick opening cast steel lid with jib crane mounted on shell; includes four supporting legs, asbestos cover and now has 8 turns or 1½″ pipe coil extending up from bottom 36″, with pipe plug inlet and outlet (coil can be removed); includes one 50″ inside diameter x 72″ steel basket. Price f.o.b Cleveland ..... $1250.00.

For Heating Above

1—Commonwealth Electric Co. steam generator, 100 pounds max. pressure for 440 volt, 3 phase, 60 cycle operation, complete with all connections and gauges. Price f.o.b. Cleveland ..... $500.00.

STEWART BOLLING & COMPANY, INCORP.
3190 EAST 65th STREET
CLEVELAND 4, OHIO
MICHIGAN 2850

FOR SALE

1—Wilbraham-Green cupola blower complete with base and 50 H.P. motor, 220 V., AC.

1—50 H.P. slip-ring motor, 3 P.H., 60 C., 220 V., 900 R.P.M.

3—Molding Machines

1—Norton floor grinder

2—Blowers

1—12″ inside diameter by 7′ 4″ Whiting hoisting cylinder with piston.

1—Monarch electric box welder, 110 V

GREEN BAY SOAP COMPANY
GREEN BAY, WIS.

FOR SALE

Royer portable sand cleaner and blender with built in induction motor, Westinghouse safety switch, cord and plug—price $100.00.

W. N. RUSSELL & CO.
34 ALBERTSON AVENUE
WESTMONT, N. J.

FOR SALE—FOUNDRY STEEL FLASK

Flask Size	Quantity
15 x 26	1 cope
6″ cope 9½″ drag	17 drags
15 x 27	
6″ cope 6″ drag	35 sets
16 x 26	
12″ cope 5″ drag	33 sets
16 x 26	
12″ cope 7″ drag	35 sets
18 x 33	
7″ cope 9″ drag	20 sets
15 x 26	24 copes
6″ cope 9½″ drag	6 drags
15 x 26	
5″ drag	25 drags
16 x 36	
6″ cope 9″ drag	25 copes

One 14 x 14 8″ cope 2½″ drag, Fremont Flask 18 cast iron jackets.

MR. ROBERT B. WHINREY
WARNER GEAR DIVISION
BORG WARNER COPORATION
MUNCIE, INDIANA

FOR SALE

One Roots-Connersville blower, "V" belt drive. Blower speed of approximately 430 R.P.M. motor attached to blower is 10 H.P., 60 cycle, 220 volt, 3 phase, 865 R.P.M., equipped with starter. Address: H. W. Clark Company, Mattoon, Ill.

FOR SALE

1—Used Sandmuller, 4 to 6 cu. ft. capacity. Give full specification and condition of machine. Reply: P. O. Box 29, Ellwood City, Pa.

Classified Advertising

For Sale

OVERHEAD CRANES

1-TON
Curtis 24′ Span
Detroit 10′ Span
Detroit 18′6″ Span
Cleveland 38′ Span
Euclid 40′ Span
Shepard Niles 12′ Span
2-TON
Conco 12′ Span
Louden 19′2″ Span
Northern 28′ Span
P&H 31′10¾″ Span
3-TON
Shaw 51′2″ Span
Chicago Tramrail 27½′ Span
P&H 37′6″ Span
P&H 42′1½″ Span
5-TON
Alliance 95′ Span
Crane 47′3″ Span
Crane 76′ Span
Detroit 38′8″ Span
Case 35′ Span
Detroit 34′ Span
Northern 32′ Span
Northern 22′ Span
P&H 31′10″ Span
P&H 72′1″ Span
Crane 37′3″ Span
Crane 57′3″ Span
Shepard 27′6″ Span
6-TON
Shaw 21′10½″ Span
7-TON
Charging & Quenching Cranes 32′ & 36′ Spans
7½-TON
Northern 26′7½″ Span
8-TON
P&H 80′ Span
10-TON
Lane 60′ Span
Cleveland 51′3″ Span
2 Yd. Morgan Bucket Crane 60′ Span
Shaw 67′6″ Span
P&H 87′6″ Span
Shaw 80′9″ Span
Alliance 58′5″ Span
Lane 50′ Span
15-TON
Overhead Crane 74′4″ Span
Outdoor Crane 57′5½″ Span
Alliance 48′9½″ Span
New Albany 50′6″ Span
Morgan 82′ Span
Northern 76′ Span
P&H 40′ Span
Whiting 38′ Span
20-TON
Overhead Crane 60′ Span
Whiting 48′6″ Span
Whiting 75′ Span
Shepard Niles 48′6″ Span
P&H 51′4″ Span
P&H 37′ Span
25-TON
Alliance 38′2″ Span
Bedford 67′8″ Span
Case 63′ Span
Overhead Crane 74′4″ Span
P&H 80′ Span
30-TON
Morgan 55′ Span
Northern 75′ Span
35-TON
Overhead Crane 74′4″ Span
40-TON
Niles 151′9½″ Span
50-TON
Alliance 52′ Span
Morgan 50′ Span
75-TON
64′8¼″ Span

Telephone us collect to discuss your requirements

ECONOMY COMPANY, INC.
49 Vanderbilt Avenue **New York 17, N. Y.**
Telephone: Murray Hill 4-1616

FOUNDRY EQUIPMENT FOR SALE

1—Tractor type sand slinger molding unit complete with overhead track.

1—Beardsley Piper 3½ cubic feet mulbaro.

9—Units of 2 each tumbling mills.

9—Single tumbling mills.

THE OLIVER CORPORATION

533 SOUTH CHAPIN ST.

SOUTH BEND 21, IND.

FOR SALE

2—2000# aluminum Fisher MNP pot furnaces, gas fired, tilting type. New linings and pots. Suitable also for magnesium and zinc. Reasonably priced. Address: SAMSON METALS, INC., 1207 S. PLATE STREET, KOKOMO, INDIANA.

FOR SALE

ALL NEW AND UNUSED EQUIPMENT

1—No. 1 Model H Simpson Sand Mixer complete with No. Model H Bucket Loader.
1—No. 56 Sly Dust Filter, type 360 with Bag Shaking device complete with motor 440/3/60, including Magnetic starter, timer, structural support, exhaust fan, V-belt drive, fan house and structural support.

THE LENNOX FURNACE CO.
400 N. Midler Ave.
Syracuse, N. Y.
Contact J. K. Dougherty

5—Int. Type R.J. power jolt hand R.O. & hand draw, Boxes 14″ wide—8″ draw.
1—Int. Type R.J. power jolt hand R.O. & hand draw, Boxes 20″ wide—8″ draw.
1—Tabor power jolt hand rollover machines, Boxes 20″ x 8″.
6—International Type J.D.P. power jolt—power pin lift—table 24″ x 36″; lift cap.—1600 lbs. —height 10 inches—adjustable pin centers to 27″ x 37″.
1—International Type J.D.P.—will handle flasks 48″ x 48″—capacity 3000 lbs.—10″ lift.

1—Demmler #3 Core Blower, practically new—$850.00.
1—International Core Blower, type S-B-15-H with Hydraulic draw.
1—Tabor Cut-off Machine with 10 H.P. 220/440 Motor—like new.
2—Beardsley & Piper Screenarators—Model S.
1—New Belt for N.D.P. Royer.

Registered as an Approved Dealer by War Assets Administration. Send us your inquiries.
Ray P. Scully

SCULLY MACHINERY & EQUIPMENT CO., Not Inc.
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Good Modern Equipment Company skip charger, used only about two years and a 78″ Whiting cupola. Real buy. See these at/or direct all inquiries to: NATIONAL MOTOR CASTINGS DIVISION OF CAMPBELL WYANT & CANNON FOUNDRY COMPANY, SOUTH HAVEN, MICHIGAN.

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Minimum advertisement set solid, 30 words $1.50. Additional words 5c each.

HELP WANTED

Minimum advertisement set solid 30 words or less $3.00. Additional words 10c each.

FOR SALE

Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

WANTED

Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

Miscellaneous advertisements such as "Personals", "Services" etc., minimum 30 words set solid $3.00. Additional words 10c each.

NOTE: If replies are to be sent to a box number in care of The Foundry, add 6 words to your advertisement for box number and address. Any advertisement set in all caps, add 50% to above rates.

For Sale

OVERHEAD ELECTRIC TRAVELING CRANES

QU	TONS	MAKE	SPAN	CURRENT
2	3	Shepard	18′0″	230-VDC
1	5•	Northern	14′0″	230-VDC
1	5•	Shaw Box	30′0″	230-VAC
1	5•	Northern	37′0″	230-VDC
1	25/5	Niles	80′0″	230-VDC

•LOWHEAD ROOM TYPE.

MONORAIL ELECTRIC HOISTS

QU	TONS	MAKE	CURRENT
2	½	LoHed	230-VDC
6	½	Shepard	230-VDC
1	1	Shaw Box	220-VAC
1	1	Wright	118-VDC
1	1	Box	230-VDC
1	3	Shepard	230-VDC
1	3•	Shepard	230-VDC
3	3•	LoHed	230-VDC
3	5•	LoHed	230-VDC

•2 motor FL. Op. Hoists we can supply them with cages.
3—¼ ton Yale stationary mounted hoists, 120-VDC. wrap 77′ of ⅛″ cable, 85-FPM., with 3-HP. motor (will furnish these arranged for 230-VDC)

ALL ABOVE IN STOCK OFFERED REBUILT & GUARANTEED.
SEND FOR OUR STOCK LIST OF A.C. & D.C. GENERAL PURPOSE CRANE & MILL MOTORS, ELECTRIC BRAKES & CONTROL EQUIPMENT, MOTOR GENERATOR SETS, TRANSFORMERS, ETC., OF ALL SIZES.

T. B. MACCABE COMPANY
4300 CLARISSA ST.
PHILADELPHIA (40), PENNA.

FOR SALE

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4—Osborn Plain Squeezers	125.00 ea.
1—#276 P. J. Osborn Jolt Squeezer	500.00
1—#210 P. J. Osborn Jolt Squeezer	400.00
2—Osborn #601 Jolt Roll-overs	650.00 ea.
2—Royer Portable Sand Blending Machines 440 V., 3 phase, 60 cycle motor	200.00 ea.
4—International 20 x 8 Draw Type R-Hand Ram, Hand draw, hand roll-over machines	125.00 ea.
1—North American Turbo Blower 2000 cu. ft. m., 32 oz., 30 H.P., 3500 R.P.M., 440 V., 3 phase, 60 cycle A.C.	650.00
4—Lowe Electric Gyratory Riddles 440 V., 3 phase, 60 cycle	70.00 ea.
1—General Electric Turbo Blower 1950 cu. ft. m., 32 oz., 27½ H.P., 3500 R.P.M., 440 V., 3 phase, 60 cycle A. C.	750.00
1—Spencer Turbo Blower 1300 C.F.M., 32 oz., 25 H.P., 1750 R.P.M., 440 V., 3 phase, 60 cycle, A.C.	700.00
1—Exhaust Fan for sand or cleaning system 40 H.P., 3 phase, 60 cycle, 440 V., A.C.	525.00
1—Electrolift Hoist ¾ ton 220 V., D.C	150.00
1—Electrolift Hoist ¼ ton 220 V., D.C.	100.00
1—Star Electric Hoist ½ ton 220 V., D.C.	125.00
1—Link Belt Portable Belt Conveyor 26 ft. long 18″ belt with all weather 440 V., 3 phase, 60 cycle motor	500.00
1—Roth Brothers Motor Generator Set, D.C., 15 H.P., 230 V., 1800 R.P.M. Shunt Wound. A.C., 220-440 V., 3 phase, about 25 H.P.	650.00
1—Westinghouse Motor Generator Set, D.C., 62.5 H.P., 230 V., 1200 R.P.M., Shunt Wound. A.C., 220 V., 3 phase, about 75 H.P.	1200.00
1—U. S. Electric Tool Grinder double spindle polishing lathe 3 H.P., 440 V., 3 phase, 60 cycle	200.00
1—Westinghouse Motor 30 H.P., 220-440 V., 3 phase, 60 cycle, 3500 R.P.M.	275.00
1—U. S. Electric Tool Co., Polishing Lathe 2 H.P., 440 V., 3 phase, 60 cycle	150.00
1—Gardner Polishing Lathe 3 D. 5 H.P., 440 Volt 3 phase, 60 cycle	500.00
1—Marschke Grinder 440 V., 3 H.P., 1800 R.P.M., 3 phase, 60 cycle	200.00

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POTTSTOWN, PA.

"Dad" Barry,

THE SAGINAW SAND MAN, SAYS:

I know the ability of MINCO BOND, and I've said so many times in our advertisements. I know MINCO BOND can increase production in any production foundry by at least 10%, and all I want is the opportunity to prove it . . . at no cost or obligation whatsoever. Wherever your foundry might be, I'll come in with our materials and go to work . . . all I ask is enough time to let MINCO BOND become thoroughly integrated in your sand system and then let it stand on its own merits. Mind you, it isn't necessary to throw out the sand you're now using and put in new, costly sand . . . I just add MINCO BOND and control all the factors affecting the condition of the sand. Furthermore, I'll guarantee you that I can run your master bin down to the bottom and keep it there because your sand will be moving steadily through your system, not stuck in the chutes where it doesn't make any castings. Whatever I claim for MINCO, I can prove and only ask the opportunity to do so.

HEAP-SYSTEM AND JOBBING FOUNDRIES

Our new ready-bonded MINCO MOLDING SANDS are now available in three grades for *immediate use.* These sands are delivered to you bonded, mulled, ready for the molding floor, and they'll give you the same top-flight MINCO performance. Whenever you like, we'll ship you sample material and come along to show MINCO BOND and MINCO BONDED molding sands in action.

"The proof of the molding is in the casting"

PROCESSED EXCLUSIVELY BY:

MINCO PRODUCTS CORPORATION

SAGINAW, MICHIGAN

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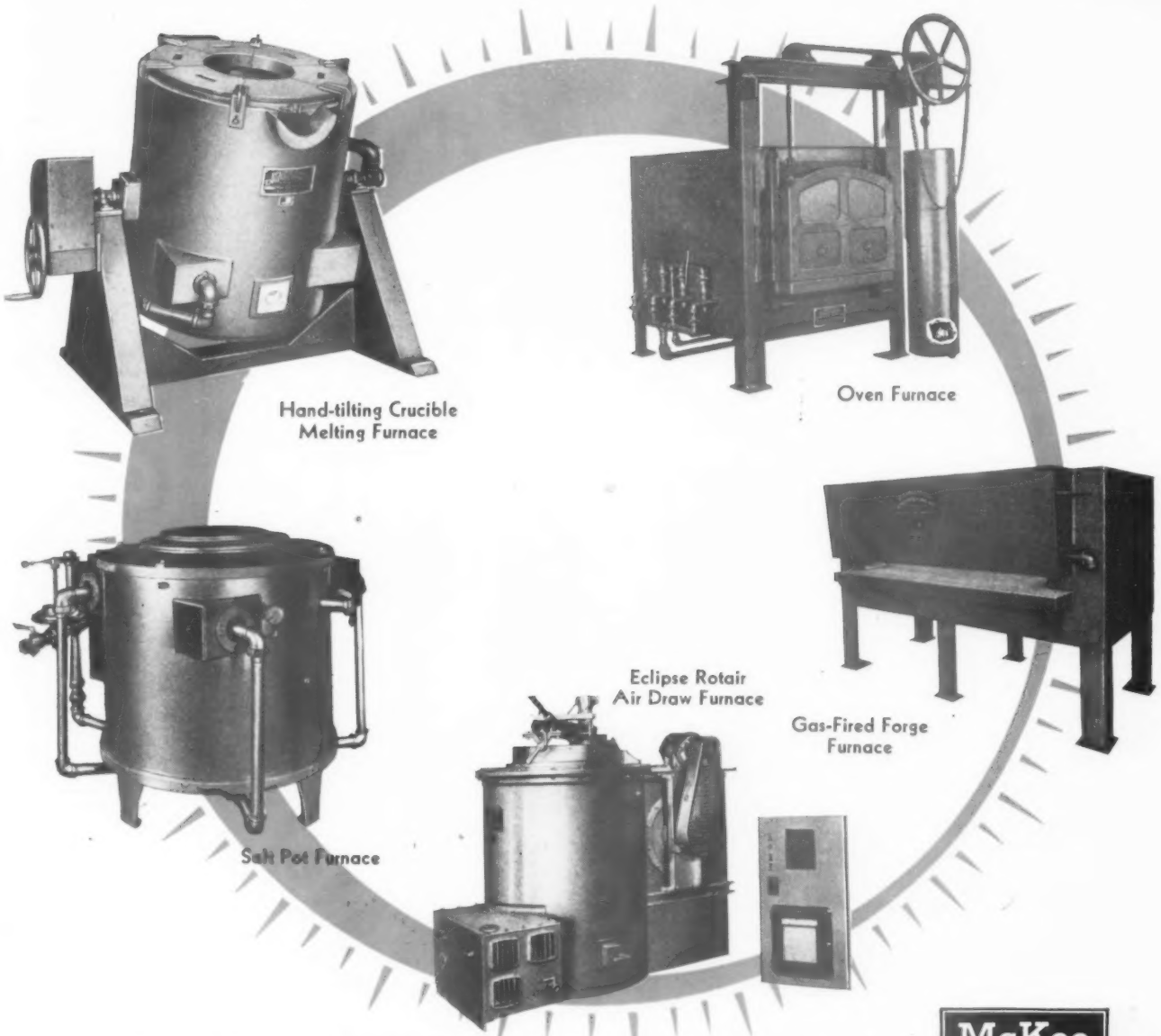

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McKee Eclipse

Pot furnaces for drawing, case hardening, lead hardening and brazing of small parts . . . heavy-duty forge furnaces . . . gas-fired oven furnaces for tempering, bluing, normalizing, annealing, carburizing and hardening of carbon and high-speed steel . . . Rotair air draw furnaces . . . hand-tilting crucible furnaces for melting of non-ferrous alloys, red and yellow brass, bronze, aluminum.

Whatever your furnace requirements, we can meet them. And the "know-how" of our more than forty years experience is at your service! Write for free bulletins.

Representatives in all principal cities. Eclipse Fuel Engineering Company, 725 South Main Street, Rockford, Illinois.

McKee Eclipse

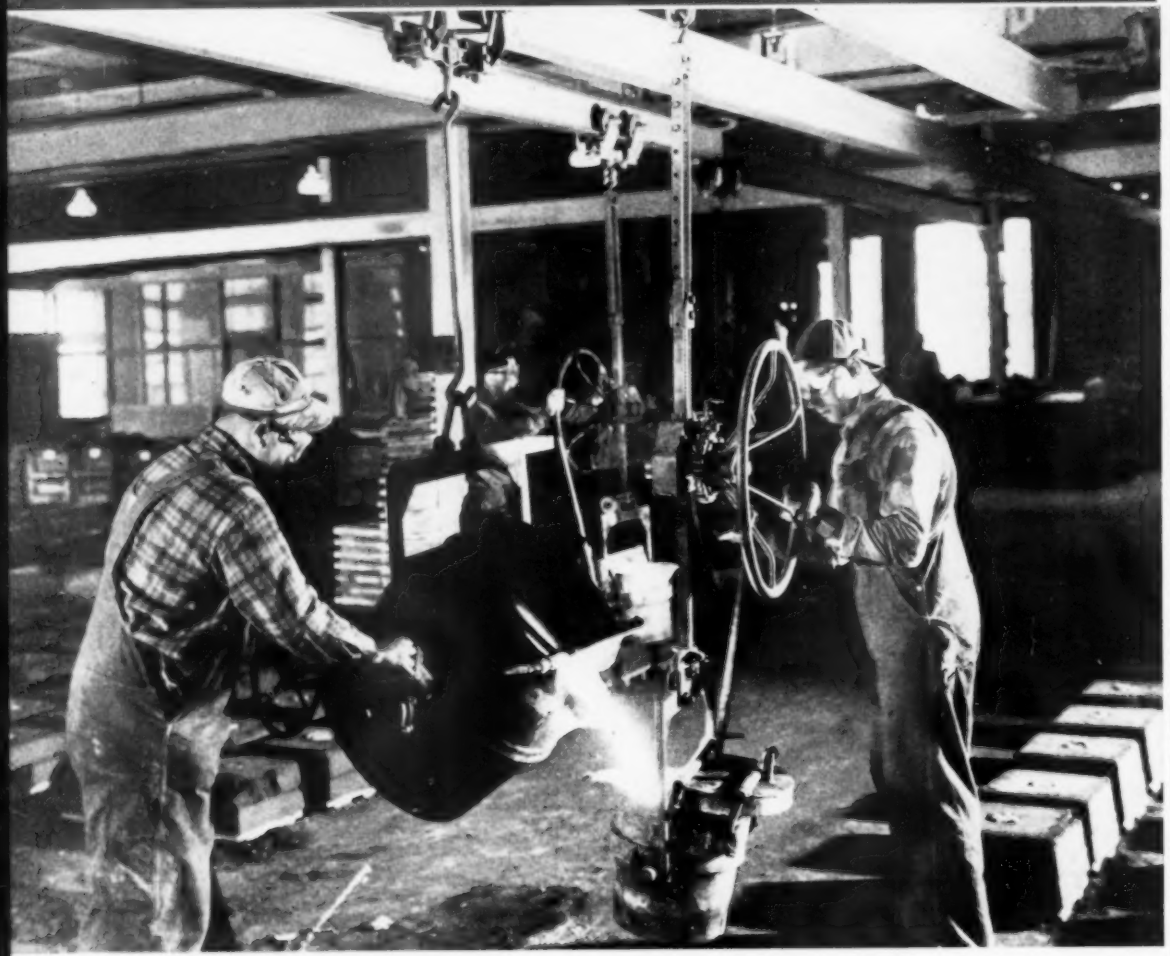
ECLIPSE FUEL ENGINEERING COMPANY

Metal Melting Equipment — Salt and Lead Pot Furnaces — Air Draw Furnaces — Forge Furnaces — Solution Heaters — McKee Centrifugal Blowers.

If it's for Gas—buy Eclipse

Walltite Burners—Proportional Mixers — Control Valves and Safety Shut-off Valves.

Easy does it! when you use Modern Pouring Devices



Look ahead—Be ahead with time-and-labor-saving POURING DEVICES

WRITE FOR POURING DEVICE BULLETIN 143

* 18-pages of helpful information and comment on the application of pouring devices for all types of foundries.

Production is increased with Modern pouring devices to a notable degree. One man frequently does the work of a costly pouring gang, releasing manpower for other duties. Modern covered-ladles permit handling of larger amounts of metal at one time, and holding it for a longer period. *Why not plan now to add the many benefits of Modern pouring devices to your operation?*

MODERN EQUIPMENT CO.

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17 Battery Place
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37 West Van Buren

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5724 Navagation Blvd.

BIRMINGHAM
Mc Voy Hausman Co.
2024 Sixth Ave., N.

MINNEAPOLIS
Minneapolis Supply Co.
706 Sixth Ave., S.

CHATTANOOGA
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ST. LOUIS
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PHILADELPHIA
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731 Commercial Trust

PROVIDENCE
Whitehead Bros. Co.
17 Exchange Place

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E. A. Wilcox Co.
277 Seventh Street

CINCINNATI
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800 Times Star Tower

CANADA
Canadian Fdry. Supply & Equipment Ltd.
Montreal Toronto

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Foundry Facings

YOU CAN RELY ON

STEVENS

EAST INDIA PLUMBAGO · CORE WASHES · BLACKINGS
SEACOAL · CORE BINDERS · PITCH COMPOUNDS
CORE PASTE · PARTING COMPOUNDS · STOPPER

FOR
FOUNDRY EQUIPMENT and SUPPLIES

FREDERIC B. STEVENS INCORPORATED · EVERYTHING FOR A FOUNDRY · DETROIT 1, MICHIGAN

Let this TRADEMARK be your
assurance of TOP QUALITY

FREDERIC B. STEVENS INCORPORATED

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NEW YORK and PENNSYLVANIA . . 93 Stone St., Buffalo, N. Y.
INDIANA . Hoosier Supply Co., 36 Shelby St., Indianapolis, Ind.

• CANADA FREDERIC B. STEVENS OF CANADA, LIMITED
• 1262 McDougall St. . . . . Windsor, Ontario
• 2368 Dundas St., West . . . . . Toronto, Ontario

4 New design and performance advantages in the LINK-BELT "CA" *(concentric action)* VIBRATING SCREEN

1 SCREEN BOX:

High tensile alloy steel plate assures high strength combined with minimum weight in screen box sides. Sides are reinforced at the vibrator and all points of suspension or mounting. Welded steel screen decks are stress relieved to prevent distortion, and to withstand vibration. Deck members are deep sections, proportioned for stiffness. Decks are riveted to box sides, forming a rigid assembly, to withstand heat, abrasion and shock.

2 SCREENING SURFACES:

For sand screens steel wire cloth is securely clamped and tensioned on rubber mountings provided in the crowned deck structure. Uniform tensioning is accomplished by means of clamp plates and bolts which pass through the box sides. For shakeouts, heavy steel perforated plate is mounted on an exceptionally strong, reinforced deck.

3 "CA" VIBRATING MECHANISM:

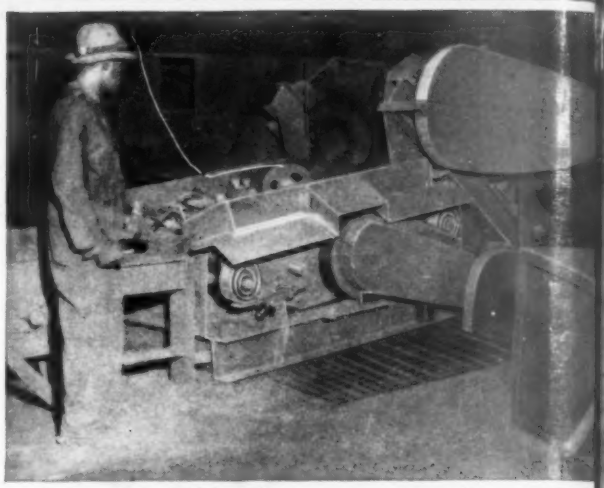
The heart of the "CA" screen is the Link-Belt two-bearing vibrator. Located near the center of gravity of the screen box, this ingenious and highly effective unit imparts a smooth, positive, circular motion to all screening surfaces. Automatic, centrifugally actuated counterweights eliminate objectionable vibrations, usually encountered through "critical" speed ranges in accelerating and decelerating screens, having fixed counterweights and large amplitudes of vibration. The high starting torques characteristic of fixed counterweights are substantially reduced by the automatic counterweight mechanism. Vibrator shaft and bearings are enclosed in an all-steel, flanged, tubular housing, rigidly secured to the screen box. Cartridge mountings for the sealed grease-lubricated roller bearings, assure accurate alignment as well as ready access for inspection.

4 MOUNTING OR SUSPENSION:

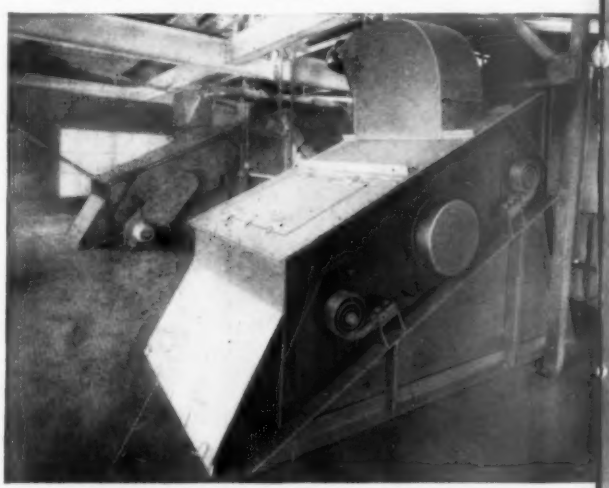
A wide selection of mountings and suspensions affords an economical choice to meet the requirements of any installation.

10,542

Ask for Book No. 2154



4 ft. x 6 ft. "CA" shakeout screen separating sand from castings in gray iron foundry.



Enclosed 4 ft. x 8 ft. single deck "CA" screens for shakeout sand in gray iron foundry.

"CA" shakeout screen for castings in gray iron foundry.

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